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This Week in The **IRON AGE**

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April 12, 1945

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Jobs for Baby Snooks and Grandpa

IT has not yet been officially proclaimed that the world owes you a living but our government has declared that it acknowledges its responsibility in seeing that you get a chance to earn one.

This is the so-called "full employment principle." In effect it says that every one able and willing to work should have jobs, and that if private employers and private individuals cannot make jobs for 60 million persons, then the government will create enough additional ones to complete the round number.

Most economists agree that full employment in our country in postwar days is highly desirable from everybody's standpoint. More than 85 per cent of our total purchasing power comes from wages. When employment is good, then business is good for industry, farmers, railroads, shopkeepers and everybody else including beauty parlors and thirst quenching emporiums.

There is a small but powerful minority that won't be happy unless the government is called upon to make the greatest possible number of these postwar jobs and indeed would like to have it make them all. But most of us believe that the fewer jobs that government has to make to keep the employment pot boiling, the better. That is because jobs created by private employers are "self-liquidating" and pay their way, whereas government jobs, depending on taxation for support, waylay the pay.

Only in two ways can government make jobs: One is out of current income or receipts; the other is out of debt.

In time of war, we expect government to call upon debt in order to make jobs. But government, even for the past 13 years, has not made a job without calling on debt to help finance it. War merely accentuated the positive which in this case was the minus sign or the negative.

Unless we look forward to a postwar repudiation of our national debt and that means the end of war bonds, of bank-notes, of savings accounts and of life insurance policy equities, the time must come—and soon—when national income must equal, at least, national expenditures.

Admitting this, how then can government create jobs and still keep solvent?

There are but two ways. One is by raising the taxes levied on those employed to a high enough level to take care of the unemployed. That means the general lowering of the standard of living. The other way to distribute employment by reducing, by law, the working hours per week. Inasmuch as we cannot consume more than we make, this is obviously another method of reducing the standard of living. We could probably keep everyone working full time, for example, even with double our present working population, if we had a 20 hour week.

But I am straying from my title. Maybe Baby Snooks and Grandpa have been included in that mystical figure of 60 million who will need postwar jobs. Who knows?

I do know that one bird in the hand of private enterprise is worth two in the bushes of bureaucracy.

John Deventer

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Meeting customers' manufacturing schedules is an Inland tradition, which we have done our best to maintain even in the face of the heavy demands and changing needs of wartime production. This principle of punctuality begins when an order is taken—and follows through the order department, the metallurgical department, Inland's modern mills, and the traffic department. To Inland, every order calls not only for high uniform quality but for cooperative service as well.

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April 10, 1945

News Front

► Salvaged war materials are being disposed of by the Allies in Italy to industry in that country. The purposes of the plan are twofold, to get rid of the material without shipping it to the U. S., and to nourish economically starved Italian industries.

► Despite the absence of publicity, V-bomb raids in England continued constantly up to the invasion of upper Holland, with the average of about 20 civilians killed and about fifty injured every day.

► Shaving aircraft gears, which only a year ago was limited to only one small gear, has now been extended to approximately 60 different gear types. Experiments conducted at the Wright Aeronautical Corp. proved that gears designed with the intention of finish grinding after hardening are equally as well suited for shaving before hardening. Other gears tested at Wright included gears which could not be ground but which had sufficient axial clearance for shaving.

Gear shaving offers several advantages including time saving, uniformity of gear tool elements and size, accuracy independent of the operator and simplicity of operation. However, machines must be carefully set up and heat treatment must be carried on in non-decarburizing furnaces.

► Basic rules for automotive reconversion were set by WPB Chairman J. A. Krug at a series of conferences between major automotive executives and WPB officials.

A date for automotive production will not be set, nor will quotas be issued until after V-E day. Although the actual go-ahead may come shortly thereafter, all production which will follow European victory will be subordinate to Pacific war needs. Present planning foresees the production of 2,150,000 cars in the first year of production.

To handle questions involving machine tools, materials and tooling, for the auto industry with the Production Readjustment Committee and other agencies a liaison office has been created in Detroit under the direction of Henry E. Nelson, director of the WPB Aircraft division.

► In the first quarter after V-E day about 1,500,000 tons of carbon steel and 264,000 tons of alloy steel will be released for such essential programs as petroleum production, public utilities, railroad and the container industry.

For the military services, this is a 23 per cent reduction in carbon steel requirements and a 19 per cent reduction in alloy steel needs. Thereafter, carbon steel requirements will be reduced by 37 per cent for the next two succeeding quarters; the cutback in alloy steel for the second quarter is 23 per cent, and in the third quarter 30 per cent. Cutbacks for the fourth quarter after V-E day will amount to 38 per cent for carbon steel and 37 per cent for alloy steel.

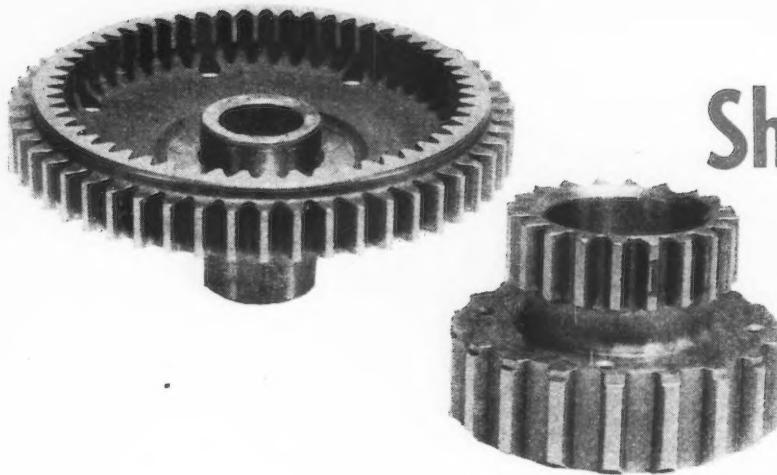
► Price fixing and international quota agreements may have to be retained in the British steel industry according to recent statements in the London Times. Some of the problems facing the British steelmakers are the comparatively high prices of coal and iron ore.

► Development of a helicopter which can carry five passengers or any type of equivalent load is going forward at Bell Aircraft, although the craft has not yet flown. Designed specifically for commercial jobs it embodies design innovations credited to Arthur M. Young as well as two and a half years of flight experience on two experimental craft.

► According to reports, Pittsburgh Steel Foundry Corp., Glassport, Pa., is negotiating a consolidation with Pittsburgh Spring and Steel Co.

► Mechanical shell loading equipment is being installed at the Ravenna Ordnance center that should save millions of manhours of labor per year in continued operation.

► Machine tool builders are giving much attention to postwar public relations problems connected with the introduction of labor-saving machines in a period of threatening unemployment. A large scale selling program is planned to counteract this stigma.



Shaved Aircraft

SHAVING as a method of finishing gear teeth was developed to a high degree of perfection by the automotive industry. The experience thus gained was based on high production operation, on steels suited to these particular requirements and on heat treating procedures developed for these particular steels. The problem faced by the producers of aircraft engine gears, in a considerable measure, was quite contrary to the experience and practice in vogue for shaved gears intended for automotive use. Aircraft engine gears are completely different in design and in operation requirements. It has been the accepted practice practically throughout the industry to finish grind all aircraft engine gears after hardening where design permitted. This practice could not be abandoned without considerable development and testing, the result of which predicated an entirely new approach before gears could actually be produced on a production basis.

For aircraft engine gears weight and space are vital factors and result in gear blanks of extremely light web sections, non-uniform distribution of material and to the minimum diameter possible. In addition, specifications established for case and core hardness must be strictly adhered to as well as dimensional tolerances, all

For descriptions of initial applications of shaving to aircraft gears, the reader is referred to the article, "Shaved Aircraft Gears," by Ivan E. Calicott and Curt A. Payntor of the Studebaker Aviation Division, Fort Wayne, Ind., THE IRON AGE, Dec. 16, 1943, p. 44; also "Shaved Gears for Aircraft Engines," by A. W. Harris of Chevrolet Motor Division of General Motors, THE IRON AGE, Aug. 5, 1943, p. 58. See also "Manufacture of Aircraft Gears," by P. W. Brown and E. V. Farrar, Wright Aeronautical Corp., THE IRON AGE, Dec. 24, 1942, p. 29.

of which are subjected to close and complete inspection. Gears designed with the intention of finish grinding after hardening are equally as well suited for shaving. Among the others were gears which could not be ground but allowed sufficient clearance for shaving and a few of which required design changes to permit shaving.

To determine what the possibilities were in shaving these various types of aircraft engine gears, a program of considerable extent and scope was decided upon and established. Many experiments were necessary, many sample lots of gears were shaved and heat treated to verify the correctness and control of the procedure established, and much engine testing was necessary to prove the value and equality of the change in manufacturing process. As a result it was found that gears designed with the intention of finish grinding after hardening are equally as well suited for shaving before hardening. Other gears tested included gears which could not be ground but which had sufficient axial clearance for shaving and gears that were redesigned to permit shaving.

Today approximately 60 different gears are being finish shaved in production at Wright Aeronautical Corp., Paterson, N. J. The following will describe how they are processed. It should be noted here that any reference to shaving refers to the rotary type machine using the cross axis principle.

Some of the advantages to be gained by finish shaving are well known and others may now be included, as follows:

1. Considerable time saved for the finishing operation and therefore higher production rate with fewer machines.

2. Accuracy controlled by shaving cutter and not dependent on care of operator.
3. Uniformity of gear tooth elements and size.
4. Simplicity of shaving machine operation.
5. Large production quantities per shaving cutter life.
6. Uniform case thickness obtained with correct heat treatment.

Partly offsetting these advantages are certain precautions that must be observed:

- A. Pre-shaved blanks must be maintained as accurately as possible and locating bore sizes held to close limits.
- B. Pre-shaved gear teeth must be cut accurately on machines that are functioning correctly and are carefully set up.
- C. Care must be exercised in loading shaving machines to avoid damage to work or cutter.
- D. Heat treatment must be carried on in non-decarburizing furnaces.
- E. Material must be of suitable hardness to produce desired finish.
- F. Gears must be carefully handled between finish shaved and hardened state.

Another disadvantage is that the shaving cutters can be applied only to a limited range of tooth numbers for the same pitch.

It should be noted that items A and B apply to any method of finishing the gear teeth for accurate preparation reduces errors that must be corrected at the final finishing operations.

In aircooled aircraft engines practically all types of gears are used with the major portion being spur gears. These include internal and external under the following category:

1. Gears which can be ground (Fig. 1, large gear, Figs. 3, 5, 12 and 14).
2. Gears which cannot be ground (Fig. 1, small gear, Figs. 9, 11 and 13).
3. Gears which are free quenched (Fig. 5).
4. Gears which are die quenched (Figs. 1 and 13).

Engine Gears . . .

By CHARLES G. PFEFFER
Gear Engineer, Wright Aeronautical Corp., Paterson, N. J.

5. Gears integral with splined shafts (Fig. 3).
6. Gears in clusters (Figs. 1, 7 and 9).

Obviously, selections for the first shaving experiment were those with the most promising possibilities. This was then extended to more complicated parts and finally to gears which are die quenched.

For all Wright Cyclone gears two types of steel are used; namely, high alloy low carbon similar to SAE 3310 (or the National Emergency substitute AMS 6260) and nitrailloy. Each of these steels reacts differently to the required heat treatment, therefore the shaving tools have to be adjusted to suit the type steel used.

All pre-shaved gear teeth are generated with protuberance type hobs or shaper cutters which are designed to produce the necessary undercut. It has been found that this undercut is absolutely essential to produce accurately shaved gears. This undercut was one of the prime objections to shaving but subsequent exhaustive tests have proved that the undercut fillet did not materially affect the load-carrying ability of the gear teeth. To date none of the gears thus shaved have shown the least evidence of failure.

With all these restrictions and possibilities in mind and how they all developed in actual production is best shown by a few examples of gears and the involute forms charted at various stages of production.

Discussion of Charts

Fig. 2 is an involute form and "Red Liner" chart of the gear teeth on part shown in Fig. 3. All teeth have been charted for involute form and an examination of the chart will show that the total variation of involute is 0.0004 in. and that this error is confined to two or three teeth. The concentricity chart at the right shows slightly under 0.001 in. runout. Actually most of this runout is in the master gear for with one full revolution of the gear and a concentric and true master gear, the start and finish of the chart must be in alignment. This chart is quite representa-

... Any gear that can be ground can be shaved, whether it is free quenched or die quenched, according to the experience of this aircraft engine producer. Many such gears are now being shaved in production. Shaving is also being done in production on cluster and internal gears which, because of their shape, could not be ground. Altogether, 60 types of gears are being shaved. In a succeeding article, carburizing and hardening procedures will be described.

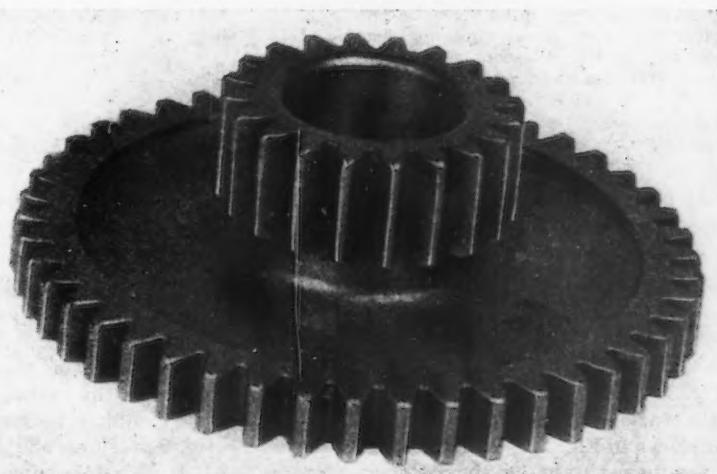
tive of the modification introduced when shaving a carburized gear. During heat treatment carburized gears have a definite tendency to change form by reduction across the tip, therefore all such gears are shaved with a heavy or full involute form. This is accomplished by changing the pressure angle of the pre-shaving and shaving cutters by a sufficient amount to produce the desired modification. This part is shaved from centers and with a 12 deg. cross axis.

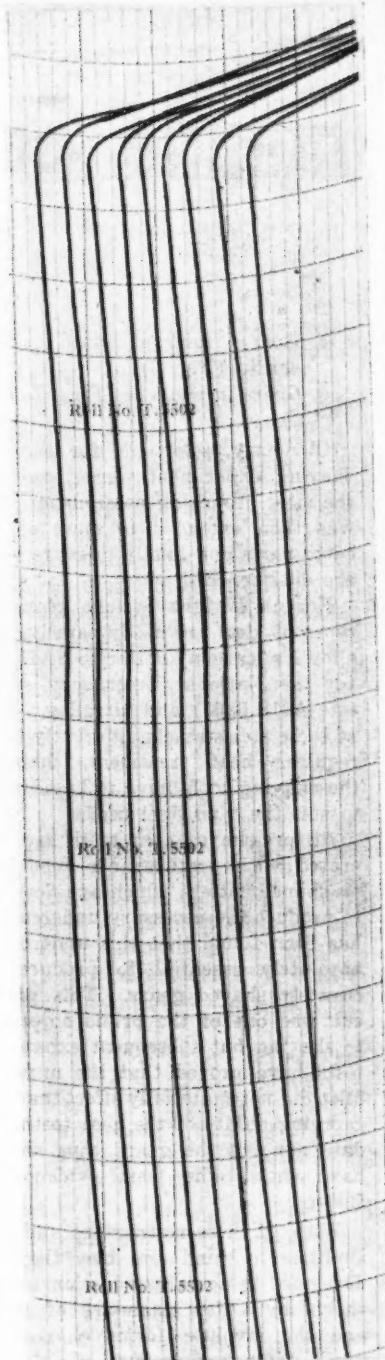
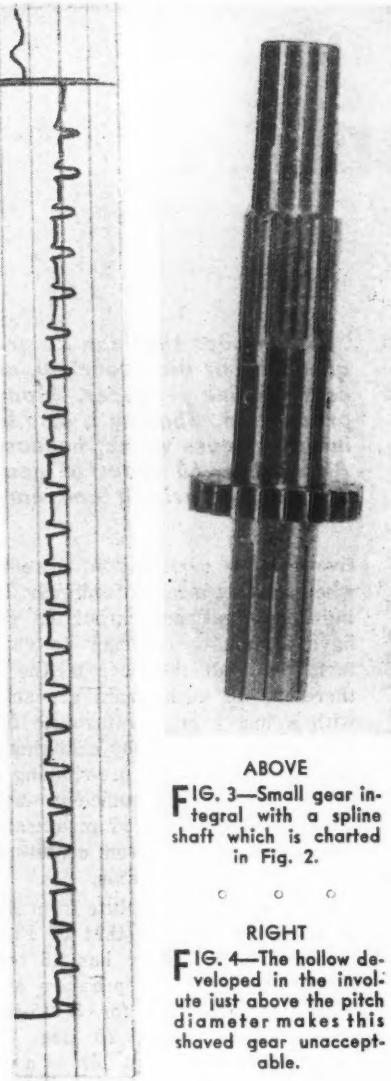
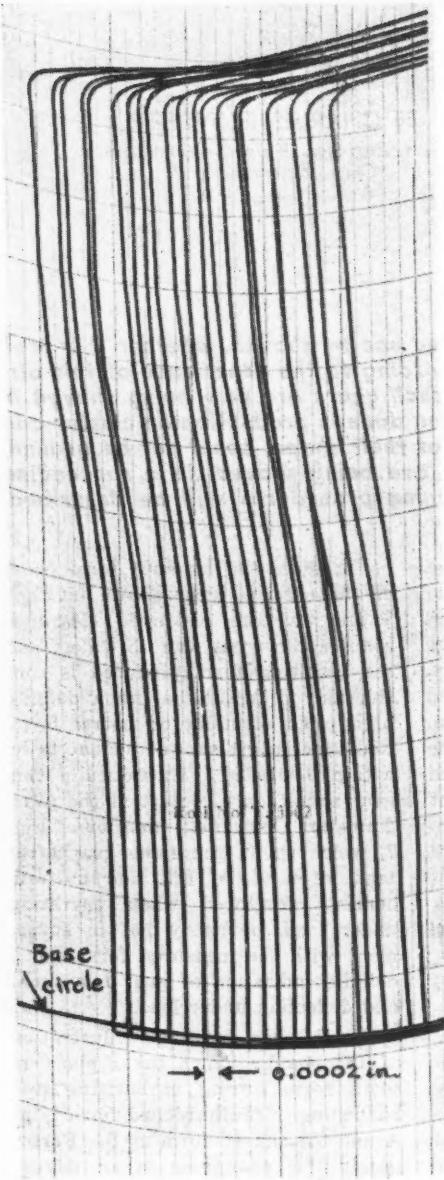
Fig. 4 shows the involute form chart of a gear similar to that of Fig. 5 except that the latter has 15 teeth, 12/18 pitch, 20 deg. pressure angle while the chart is for a 15-tooth pinion of 8.4 pitch, 20 deg. P.A. This form is not acceptable, as a definite hollow has developed slightly above the pitch diameter and a change in cross axis, or in the pre-shaved form, must be made to eliminate this condition.

Fig. 6 is the involute form chart of the external gear shown in Figs. 7 and 9. The restricted clearance reduces the cross axis to 4 deg. and the resulting form produced is considerably different, having a definite high pitch diameter or barrel form. Red Liner chart showed runout to be within 0.0015 in. Theoretically this gear should only contact at the pitch diameter. Yet an examination of Fig. 7, which shows the same gear after test, reveals the full and uniform bearing developed when operating under load, obviously not in agreement with the measured form and a definite indication of gear movement and deflection under load.

Fig. 8 gives a further illustration of the change which takes place in tooth form during carburizing and hardening. The hardened form is at A and the shaved form at B. Fortunately this change is in an advantageous direction in that it minimizes

FIG. 1—The fact that both gears of this cluster are now shaved, where only the larger gear was previously ground (the smaller gear being finished by shaping) is indicative of the progress made in the adaptation of this finishing process to production. This is a die quenched part.





tip interference under deflection loads. This particular chart is of the internal gear of Fig. 9. The amount of modification necessary to produce the desired barrel form depends largely upon the size of the gear teeth and is established mainly by experience and trial. A fair average is 0.001 in.

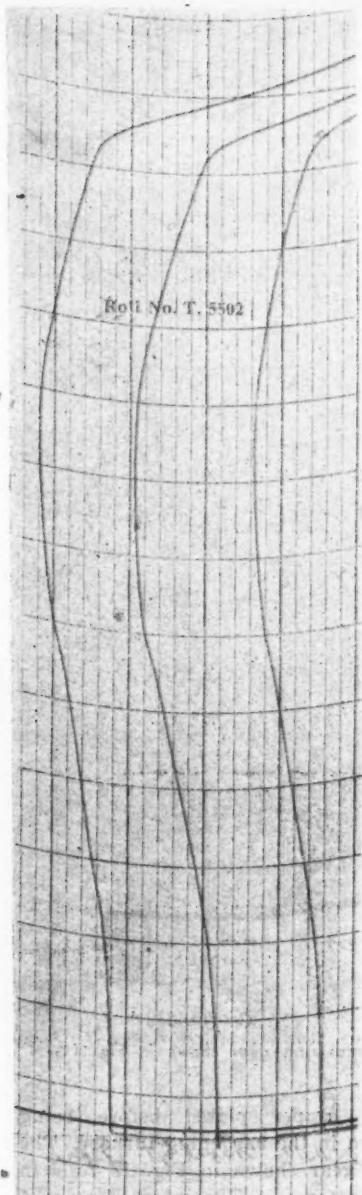
Fig. 10 is the involute form charts of the various stages of an internal gear shown in Fig. 11. At A is shown the pre-shaved state and the undercut

produced by the protuberance type shaper cutter. At B the finished shaved form shows clearly how the shaving cutter has straightened and corrected the involute form within very close limits. After nitriding, at C the true form change is shown to be very slight. The deviation from the perpendicular line is the characteristic evidence of runout and the result of grinding the locating diameter after hardening slightly eccentric. At D, after lapping, it is

quite evident that this lapping has not corrected the eccentricity and has produced a 0.0001 in. error in some of the teeth.

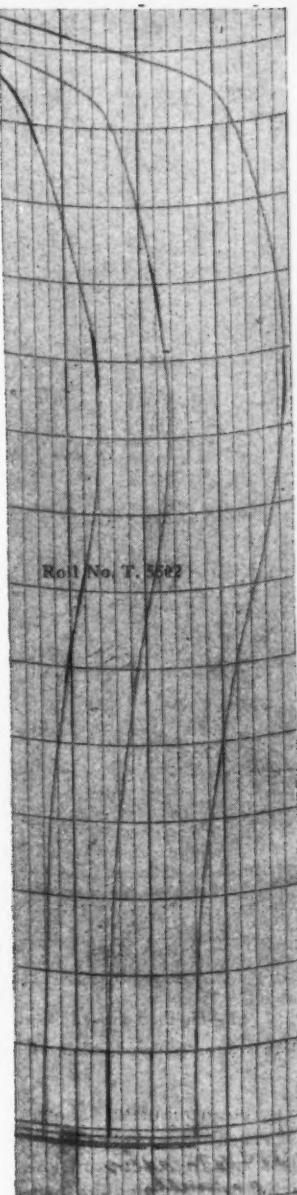
Nitralloy Gears

Nitralloy steel has certain characteristics which require that such gears be lapped after hardening. The procedure outlined for the gear shown in Fig. 11 has been successfully used on this and similar type gears. Some external gears of smaller diameter and tooth numbers, however, have not

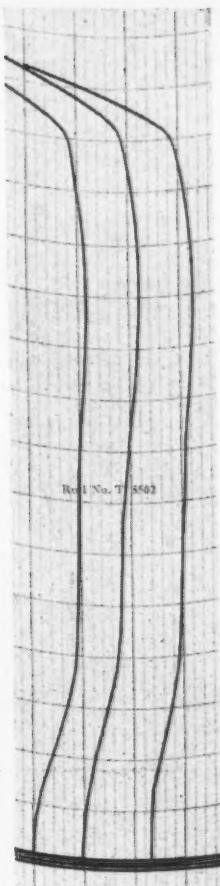


ABOVE

FIG. 6—Involute charts of the external gear shown in Figs. 7 and 9. A definite high pitch diameter or barrel shape is indicated.



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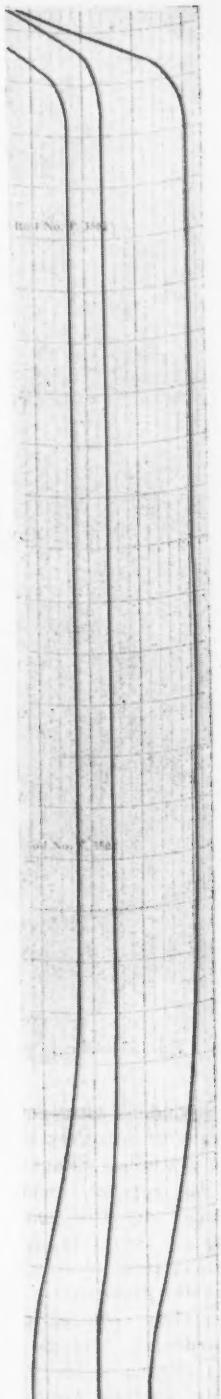
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ABOVE AND LEFT

FIG. 8—Charts of the internal gear shown in Fig. 9. Chart at right is for the green shaved gear; at the left, the same gear after hardening.

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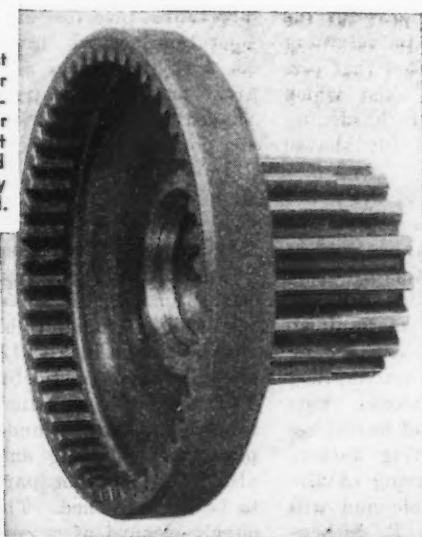
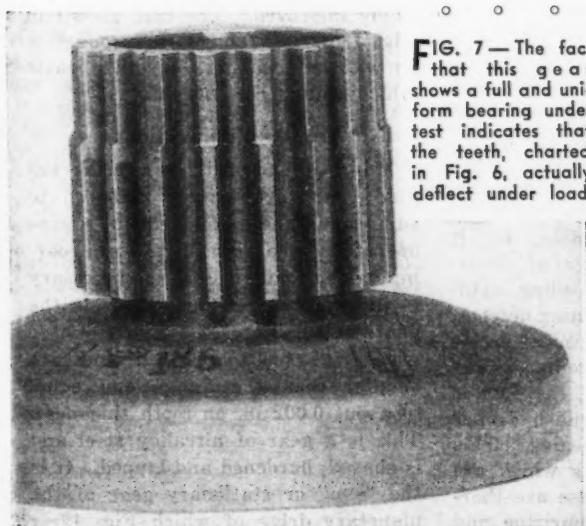
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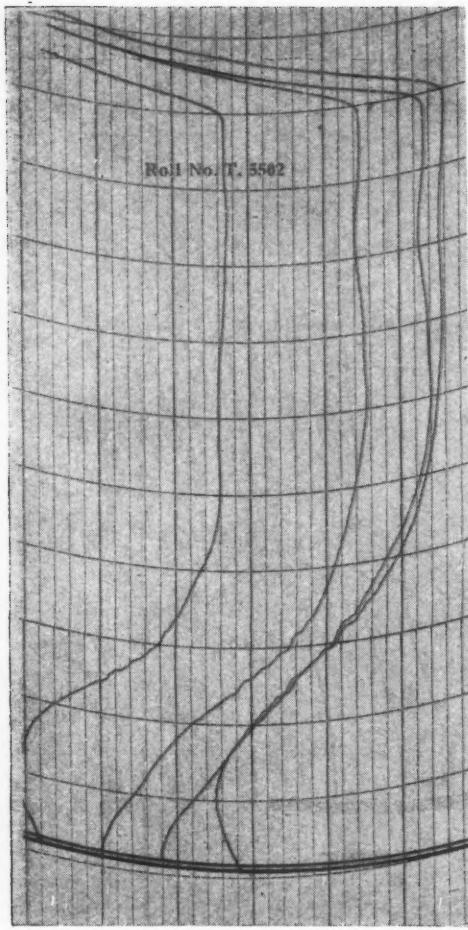
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LEFT

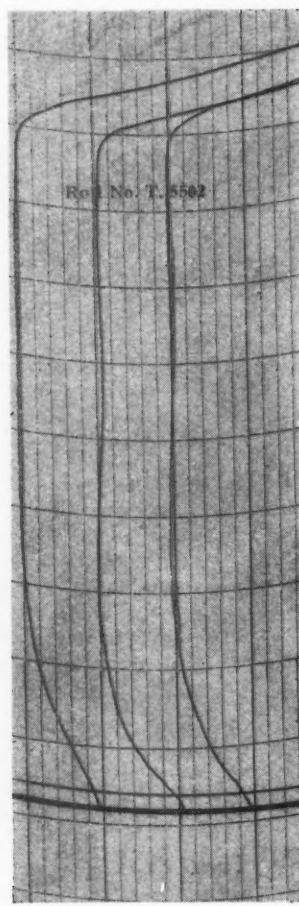
FIG. 9—Another view of the gear illustrated in Fig. 7, showing the internal gear which is also shaved.

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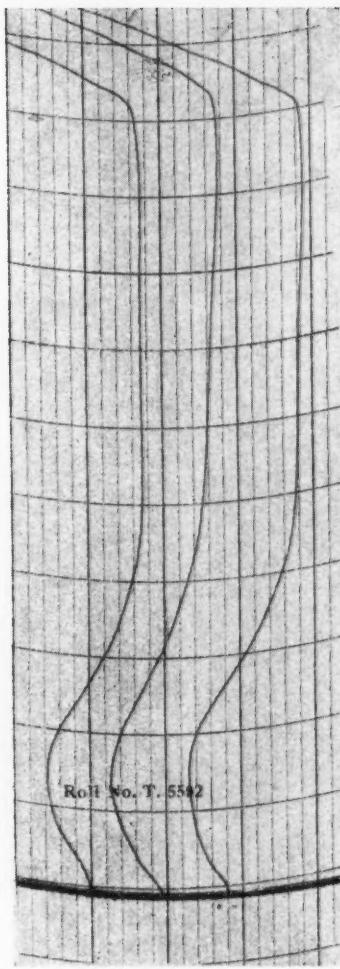




A—Pre-shaved



B—Finished shaved



C—Nitrided

Fig. 10—Charts of the involute form taken during various stages of production of the internal ring gear shown in Fig. 11.

responded with equal success when made of nitr alloy steel and processed in a similar manner.

In general, most nitrided gears have only the gear teeth hardened which, therefore, is localized and the supporting material prevents excessive distortion. Also the fact that nitr alloy requires a low heat for the hardening process aids in retaining its original form. The fact that certain surface conditions exist which must be removed after hardening makes it less desirable for shaved gears, however.

As the major portion of the gears used are carburized, one of the first requisites is that the gear teeth meet hardness specifications and are free from decarburization. To insure that these specifications were maintained, an improved method of carburizing was developed by Wright Aeronautical Corp. materials laboratory. This method of carburizing and hardening is one of the contributing factors which has made the shaving of aircraft engine gears possible and will be outlined in detail by R. Lieben-

dorfer of Wright Aeronautical laboratory in a succeeding article. Heat treat distortion usually found in normal carburizing and hardening procedure is also considerably reduced by this method. Some shaving practice is to rough cut, carburize, anneal, pre-shave cut, shave and harden. This procedure involves many additional operations which are unnecessary, as, with the proper and correct heat treat procedure, gears can be finish shaved before carburizing, as is being done at Wright Aeronautical.

In some instances it is necessary to anneal carburized parts for further machining. This procedure is avoided whenever possible, as it is merely another source of decarburization. Internal threading, drilling of oil holes and machining notches, such as shown in Fig. 12, must necessarily be in the part before hardening. To avoid decarburization, the part is thoroughly cleaned and flash copper plated before being annealed. This also holds true for parts which are to be die quenched. These are thoroughly cleaned after carburizing and

flash copper plated before being placed in the hardening furnace. The type gear shown in Fig. 13 falls in this category. The internal gear of this cam cannot be ground and it has been successfully demonstrated that such a gear can be shaved to advantage and the resulting product is definitely improved. The cam shown in Fig. 13 is now shaved in production as well as a number of other parts which require die quenching.

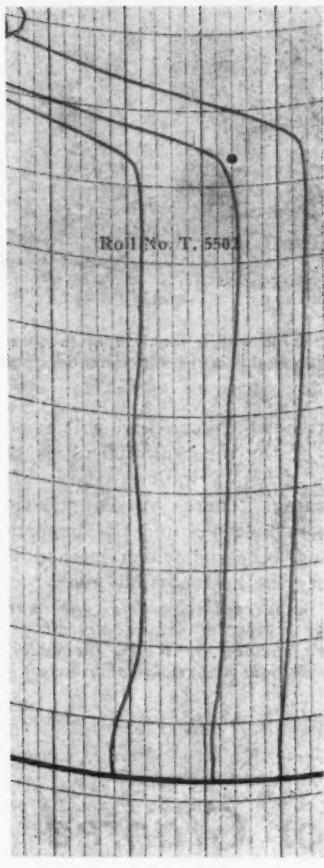
Tooth Modifications

Many of the critical aircraft engine gears are actually tailored to suit conditions developed in engine operation. To distribute tooth bearing under load it is often necessary to incorporate a definite taper in the gear teeth. Fig. 14 is such a case where the teeth at open end are smaller than the flange end equal to about 0.002 in. on tooth thickness. This is a gear of nitr alloy steel and is shaved, hardened and lapped. It is the "sun" or stationary gear of the planetary drive of which Fig. 12 is

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the mating pinion. The latter is shaved, carburized, hardened and finally grit blasted. This train has recently completed several severe tests successfully, but shaving is not yet done in production.

Crowning or elliptoid tooth forms have been attempted but the results did not warrant any further experimentation. In general, the face width of aircraft engine gears is entirely too narrow to take full advantage of this feature. Where necessary a definite taper tooth, such as used for the gear shown in Fig. 14, has solved the problem of misalignment under load.

From the foregoing it is clear that a very uniform and accurate gear is produced up to the hardened state. It is, therefore, necessary to maintain this accuracy during and after hardening. Distortion is controlled by proper heat treating procedures. Carburized gear teeth are given a light blast with very fine grit and low pressure. Gears such as those shown in Figs. 1 and 5 then have the bore honed to size. As the hone must follow the original path, close accuracy is maintained and the only correction made is for out of roundness. Thrust faces are then lapped to complete the gear for final inspection. Where additional grinding operations are necessary, a locating sur-

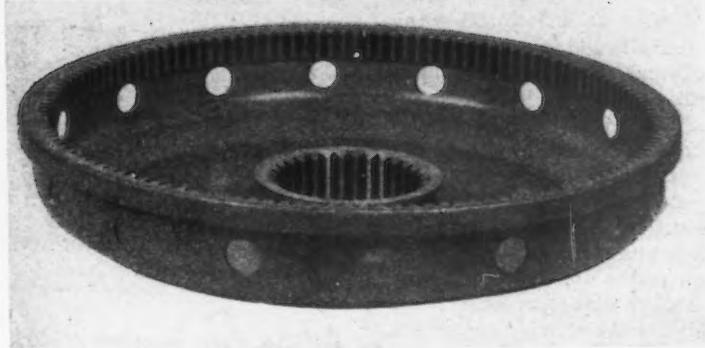


FIG. 11—Shaving is an added operation on this internal nitralloy ring gear, charted in Fig. 10.

FIG. 12—Shaving development is still in progress on this gear, in which internal threading, drilling of an oil hole and machining of notches must be performed before the part is hardened.

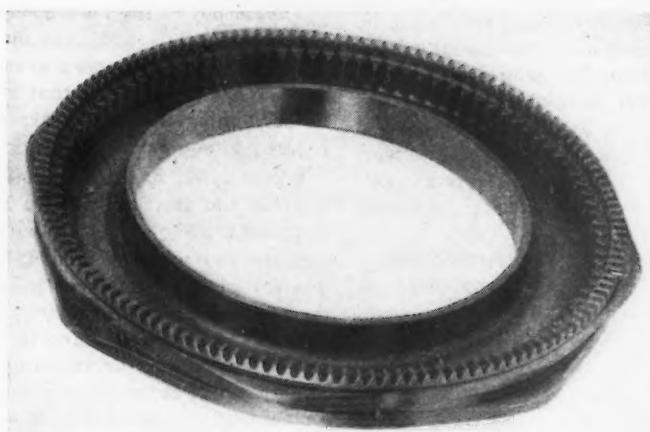
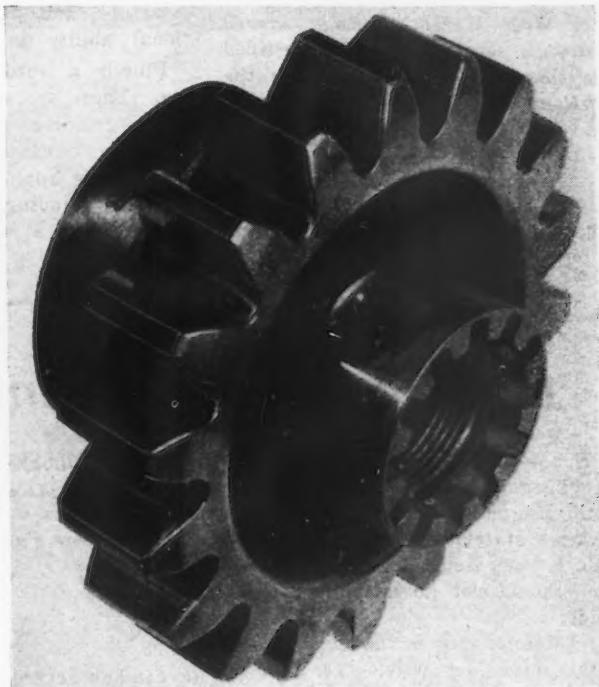


FIG. 13—Shaving of the internal gear is an added operation on this thin webbed cam which has to be die quenched.

face is prepared by honing and the subsequent operations held in relation to such a surface.

In arriving at the cost of shaving many other factors must be consid-

ered. Much experimenting is often necessary to establish the correct blank and shaving cutter combination. Pre-shaving tools must be correct and carefully controlled. Locat-

ing sizes must be maintained within very close limits and in some instances must be honed in the green to insure proper fit on arbors. Where smooth fillets are essential, gear teeth are rough hobbed, pre-shave cut with a shaper cutter and then shaved. Uniform stock must be removed by the shaving cutter and it is desirable to reduce this to a permissible minimum. The importance of accurate pre-shaved blanks cannot be emphasized too highly, as the shaving cutter has a definite tendency to follow the pre-shaved form, especially on gears of small diameter and tooth numbers.

In the final analysis the experience with Wright Cyclone shaved gears in service has fully justified the time and effort devoted to the development. The outcome is that shaved gears are being produced on a production basis which are uniform in size and tooth form, have uniform case thickness on all tooth surfaces, meet all specifications as to case and

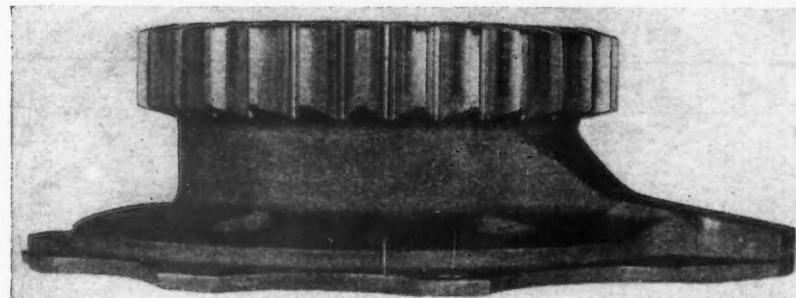


FIG. 14—The teeth of this nitrallyo sun gear are shaved with a slight taper to obtain proper tooth bearing under load. This shaving job is still in the experimental stage.

core hardness with an excellent grain structure, and perform with exceptional ability in engine operation.

Finally a word about gear grinding. There are still many gears on which grinding will continue. The procedure outlined for shaved gears can also be applied to ground gears (that is, grinding in the soft state), thus opening a new field for its ap-

plication which can and will remove some of the inherent difficulties that result from grinding gears after hardening. There are applications for both methods and the important decision concerns which method will produce the best possible gear.

[In a succeeding article, the metallurgical aspects of shaved aircraft gears will be covered by R. E. Liebendorfer of the Wright materials laboratory.]

Don't Take Equipment Failures for Granted

IN the second part of his article, "Large Scale Working of Adirondack Magnetites," Frank J. Oliver makes a statement on page 52 of the Feb. 1, 1945, issue of THE IRON AGE that should not go unchallenged. It reads:

"Maintenance is the big item in this quarrying activity as it is in the crushing plant and in the concentrator mill. It is pure luck if all the power shovels and trucks are in operation at once. In the mill there are bottlenecks galore caused by mechanical breakdowns, a motor burns out on the primary crusher, a 48 in. rubber belt begins to tear apart or the roller bearings get 'shot' on the sintering machine pallet conveyor."

It is safe to say that the mechanical or electrical failure of any piece of equipment is preceded by some human failure such as:

Failure to install equipment designed for that particular kind of work

Failure to make operators equipment conscious

Failure to properly maintain that equipment.

It is a fact that modern equipment designed for the job, properly installed and properly maintained will give continuous service with little or no interruption to operation regard-

By GILBERT LINDGREN
Electrical Maintenance Foreman,
Troy Coke Plant,
New York Power & Light Co.

less to how severe that operation may be.

This is not to say that good equipment never fails and that machines designed for rough service never wear out. What is meant is that there is no such thing as a necessary evil in regards to equipment failure.

Where you find that equipment failures and the maintenance of that equipment are interfering with production, you will also find a lack of interest in the equipment itself and the methods of handling maintenance problems. Where a plant is handicapped by obsolete or unsuitable machinery which cannot be remodeled or replaced, then attention should be focused on the application of maintenance rather than on the machines. Such attention will bring to light many changes that will lead to far less operating interruptions.

Years ago in the steel mills, failures on the screwdown drive on blooming mills was considered as a necessary evil; these motors were subjected to

heavy overloads, severe plugging and reversing, stalling against jammed rolls, heat and dirt. A mill used to carry two or three spare armatures. It expected burnouts and it had them; yet today such drives are put through the same paces and give little more trouble than any other drive. Improvements have been made by a change of attitude in regards to necessary or expected breakdowns.

Too often it is taken for granted that severe operating conditions justify a few shutdowns or that a burned out motor naturally means a serious delay. Instead of setting aside \$1000 in the budget to take care of motor rewinds, spend \$500 preventing motor rewinds and the following year you will find that you can reduce the \$500 item.

No! Mechanical or electrical equipment failures are not a necessary evil connected with severe industrial operations. First, check your equipment carefully, then apply pressure to scheduled inspection and to repairs that are timed to cause the least interruption to operation. See to it that operators realize that it is just as important to keep machinery running as it is to run it. Make up your mind that it is not pure luck or unlucky when machines run or fail to run—it's the human element that governs that, 99 per cent of the time.

Yoke Riveter

Reaches Inaccessible Places

A DIFFICULT riveting operation encountered by the wing flap fabricating department of the Interstate Aircraft & Engineering Corp., El Segundo, Calif., led to the design and installation of an ingenious riveting fixture. Primarily this device was made for riveting a top skin of 0.032 in. gage 24S-T aluminum alloy to a $\frac{3}{4}$ in. rib flange of 0.020 in. material extending from the spar to the trailing edge of the flap, a distance of 28 in., using modified brazier head rivets.

To give the yoke riveter fore and aft movement along the contoured surface of the rib flange and skin and complete coverage of the wing flap area, the unit is suspended by an adjustable chain from a trolley running on a rail which forms the cross arm of a swinging jib crane, the latter made of a pipe stand riveted to the floor. Details of the yoke riveter design may be seen in the photographs. Actuation of the yoke is by an air cylinder and toggle links.

Time studies show that an 80 per cent efficiency increase was accomplished in comparison with the old method of riveter and bucker.

UPPER RIGHT

OLD method of riveting and bucking on contoured surface of wing flap; a two-man job, awkward and slow. With the new yoke riveter only one operator is needed.

CENTER

EXTENDED arm yoke riveter enables operator to reach furthest extremities of job with ease. This model is made up of two pieces of heavy-wall tubing, the upper being pivoted with respect to the lower and brought into operating position by the air cylinder and toggle link seen at the left. Note the adjustable tilt table for conformation with wing flap section contours.

RIGHT

SHORT length rivet arm permits close-up work. This model utilizes a flat steel plate for the base, but the same air actuated toggle for initial adjustment of the yoke opening in placing the rivet set in position. Standard rivet guns are employed.



Chemistry Of Surface Cleaning

By RAY SANDERS

General Manager,
Turco Products, Inc., Los Angeles

... Cleaning is a complex phenomenon involving in various combinations such actions as wetting, emulsification, saponification, colloidal activity, solvent power, pH, buffer action, total alkalinity and acidity and water conditioning. Much of the enormous amounts of time and labor expended in the removal of the common forms of dirt and paint can be cut by a knowledge of the basic factors involved in each surface cleaning job.

TO the layman, dirt is self evident and requires no further explanation. To the scientist, dirt is a complex of chemical and physical components, with widely varying reactions under different circumstances. The mere enumeration of some of the common forms of dirt—rust, corrosion, tarnish, scale, oil, grease, carbon, grime, smut, paint—will give some indication of the complexity of the problem. All these forms of dirt, or any combination of them, may be present on any single

article requiring cleaning. An understanding of the chemical and physical nature of the more frequently recurring kinds of dirt and the factors definitely associated with detergency may prove valuable in the proper selection of a cleaning agent or method designed to remove dirt.

Before a surface can be cleaned it must first be wetted by the cleaning solution. Wetting action serves to bring the detergent solution into close and intimate contact with the soil, enabling it to penetrate soil so that the energy of detergency can be brought to bear where it accomplishes most. A surface which has been completely wetted by a detergent fluid has been separated by a cleansing film from contaminating matter, and is therefore well on the way to being cleaned.

It is popularly believed that wetting action is a natural property of all fluids. Actually, liquids vary greatly in their ability to wet. Water, which has the reputation of being the "wettest" of substances, in reality possesses much less wetting power than such familiar liquids as ammonia, acetone, benzene and most oils. Fortunately for economy in detergency, the wetting properties of water can be greatly increased by chemical treatment.

The wetting powers of fluids can be increased by reducing their surface and interfacial tensions. The force of surface tension can be demonstrated by a simple experiment. Fill

a glass to the rim with water. If an additional small amount of water is added, it will not overflow but the surface of the water in the glass will form a convex dome higher than the rim of the glass. Surface tension keeps the water from overflowing. If the force of surface tension were reduced, the water would overflow immediately.

Pure water has a much higher surface tension than most oils. When pure water is poured on an oily surface, the surface tensions of the oil and water resist each other with the result that the water is unable to spread over or wet the oil film. Instead, the water forms individual round drops or pools with convex domes—a precise reflection of the forces of surface and interfacial tensions involved in the situation. Now if the surface tension of the water is reduced so that it is equivalent to that of the oil film, it will spread out over the oil film. Reduce the surface tension of the water still further so

FIG. 1—Wetting action in progress, captured by the high speed camera. A mass of heavy oil adheres firmly to the bottom of the beaker. Wetting action causes a portion of the oil to rise to the surface.



FIG. 2—A thousandth of a second later. The tension between the oil and water has been reduced by a cleaning agent. Large globules form at the surface of the oily mass.



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that it is actually less than that of the oil film, the water will then penetrate and displace the oil. When this occurs a remarkable thing happens—the oil forms droplets on the surface of the water film. These droplets may not yet be completely detached from the soiled surface, but the oily mass has been penetrated and its adhesion weakened by complete wetting. This process of wetting is illustrated in Figs. 1-5.

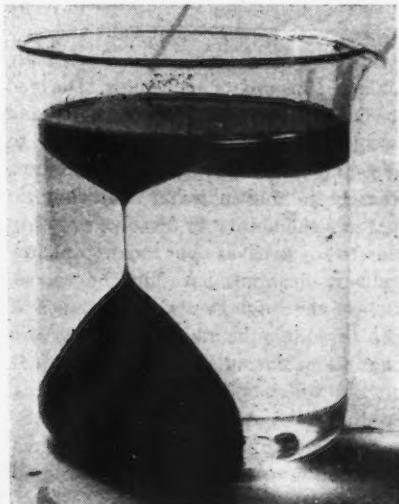
Emulsifying Power

The forces of cohesion which hold an oily film to a surface are remarkably strong. It is almost impossible to completely remove an oil film by the shearing action of wiping or scrubbing alone. This can be demonstrated for example, by repeatedly wiping a lard coated frying pan with a cloth until no more lard is visible and then applying the water break test. Invariably, water will resist wetting such a surface proving that an oil film perhaps molecular in dimension still remains.

It has been mentioned previously that thorough wetting results in the formation of globules of oil on the surface of the detergent film. Here the process of emulsification comes into play. If an emulsifying agent is present in the detergent, the oily globules will be detached from the surface and will be dispersed through the cleaning solution. The adhesion of the oil to the surface has been permanently disrupted. Once so scattered the portion of the oil removed

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FIG. 3—A large portion of the oil has been detached and floats to the top of the cleaning solution. The oily mass has contracted, leaving most of the beaker bottom clean.



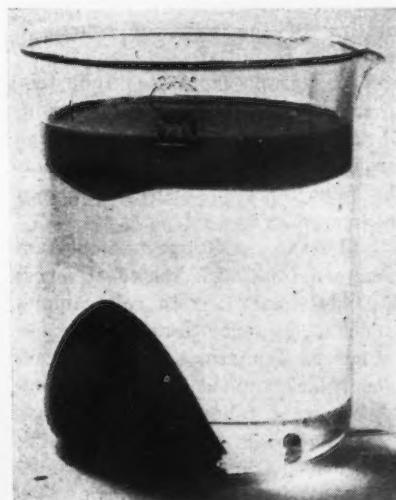
cannot be redeposited as film. (See Fig 6).

When a portion of the oily film has been removed in this manner, another layer of the film is exposed to the wetting action of the detergent. Emulsifying action then comes into play again and disperses an additional portion of the oily mass. It can be seen that emulsification is contingent on wetting and that further wetting is contingent on emulsification. The combined effect of the two actions is the loosening, breaking up and dispersion of oily films.

Emulsions vary considerably in their permanency. Some emulsifying agents form protective films around the oil droplets which prevent their coalescence with neighboring droplets. The resistance of the emulsion to breaking up is thereby increased. These are known as permanent emulsions since they endure for long periods without separation of oil and medium. Milk is a familiar example of a stable emulsion. In the case of

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FIG. 4—The cleaning solution is beginning to penetrate beneath the oil. When oil and surface have been separated by the cleaning solution, wetting action will have been completed.



emulsifiers producing quick breaking emulsions, no protective film is provided. Hence, surface tension causes the oil droplets to coalesce whenever they touch each other. The droplets become larger and larger, ultimately forming a continuous oily layer which floats to the surface of the medium.

In a cleaner designed for use in immersion tanks it is desirable that the emulsion produced be of the quick breaking type. After the bond between the oily film and the surface is

broken and the oil dispersed so that it cannot be redeposited, it rises to the surface of the tank where it may be readily skimmed off. In this manner the life of the cleaning solution is greatly increased. On the other hand, in a cleaner designed for application by wiping or spraying, the emulsion produced should be stable. Since the cleaner is applied as a film over the surface a quick breaking emulsion would tend to redeposit oil over the surface being cleaned. In a stable emulsion the dispersed oil will remain in suspension until it is rinsed away.

The extent to which oil is emulsified and the speed with which emulsification takes place is determined primarily by the character and concentration of the cleaning agent employed. The process is furthered by agitating, and to some extent by heating the solution. The method by which the cleaner is applied, therefore, plays a part in oil removal through emulsification action.

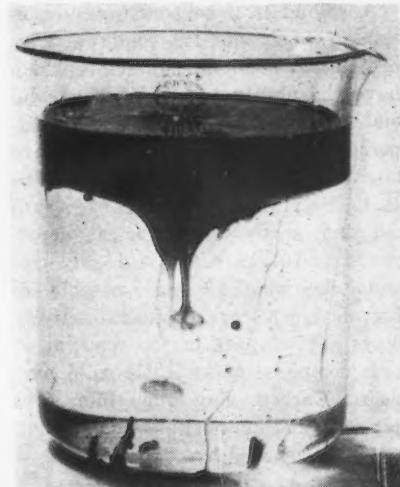
The process of emulsification does not produce a chemical change in the oil as it is removed. The oil remains oil except that it is dispersed throughout the detergent medium in the form of very small globules. However, the process of emulsification facilitates a chemical reaction, saponification, which permits certain oils to pass into actual solution in the cleaning agent, Fig. 7.

Saponifying Value

Saponification is the process whereby fatty acids present in animal and vegetable oils unite chemically with

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FIG. 5—Finally the adhesion between oil and surface is completely disrupted. Note remaining oil floating up as small droplets.



certain alkaline substance to form soap. The soap so formed is quite similar, if not in external appearance, to household soap in its chemical properties and behaviour. The removal of fatty acid soils is one of the major problems in detergency. Many greases consist of a mixture of animal fats, such as tallow, and petroleum oils. Petroleum oils cannot be saponified and must, therefore, be removed through the processes of wetting and emulsification. But the fatty acid components of lubricants do react with certain alkaline detergents to form water soluble soaps.

The process of soap formation has a chain of consequences of vital importance in the detergent reaction. To begin with, a considerable portion of the soil is made soluble in the cleaning solution. The dissolved soap brings about a further reduction in the surface and interfacial tension of the solution, and increases the emulsifying action of the detergent. In turn, the process of saponification is further stimulated when additional fatty acid soil becomes available in small droplets. The dissolved soap also has a dispersing effect on solid particles, and if the concentration of saponified material builds up sufficiently it may exert a direct solvent effect on oils and other substances ordinarily insoluble in aqueous solutions.

It will be seen that a properly balanced cleaning compound exerts a definite chain effect in which one action reinforces the other and is in turn reinforced. The utilization of the process of saponification in cleaning is remarkable in that a portion of the soil itself is pressed into service to help in the removal of the remaining soil.

Colloidal Activity

A colloid is a non-settling suspension of finely divided solid particles in a liquid medium. Materials which have the ability to break up a solid mass into small particles and to disperse them through a liquid are known as deflocculating agents. The earliest detergent known, for antedating soaps and chemical detergents, is fullers earth, a highly colloidal clay which possesses notable deflocculating powers. Colloidal activity plays a vital part in the removal of soils composed of insoluble solid particles. Carbon, clay, road film, food deposits and paint films are among the soils removed by colloidal forces.

The mechanism of deflocculation is



FIG. 6—An emulsifying agent is added and the contents of the beaker agitated by a stirring rod. The mass of oil is broken up into tiny globules, uniformly dispersed through the water.

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believed to involve the neutralization of those forces of surface tension responsible for the attraction between solid particles. Experimental data reveals that in every instance deflocculation is attendant upon a reduction of the forces of surface and interfacial tensions involved. Complete wetting of the solid, of course, is necessary to initiate deflocculation.

A paragraph from the "Industrial Chemistry of Colloidal and Amorphous Materials" by Lewis, Squires and Broughton may serve to illuminate the importance of dispersing power in detergency:

"Perhaps the most important method (of testing the effectiveness of detergents) is to soil samples of fabric under controlled conditions by a mixture of oil and carbon black applied by using a volatile solvent, followed by comparison of samples after careful washing with the detergents under test, preferably using one of known effectiveness as a standard. The importance of dispersion power in detergency is attested by the fact that the capacity of the detergent to cleanse such a fabric parallels its power to disperse suspended particles, such as carbon black, manganese dioxide, iron oxide and the like in water. The direct determination of this dispersing power therefore offers a second important testing method."

In laboratory practice this test may be made by placing a measured

amount of Norite, a highly absorptive activated carbon, in a test tube, adding a given volume of the detergent under test, and determining the length of time required for the solution to completely wet the carbon and disperse it.

Colloidal forces are important not only in the direct dispersion of solid particles but in the softening and swelling of resinous binders, which are a factor in the adhesion of paints, enamels and similar coatings.

Solvent Action

Solvents may be divided into two broad classifications. In one group the dissolved substance splits up more or less completely into groups of molecules called ions which possess definite electrical charges. Water is the most familiar solvent of this type. The solvent properties of water are utilized in cleaning to remove many salts, acids, sugar and syrup deposits. In aqueous cleaning solutions water also acts as the solvent medium for the detergent compound, thereby liberating the energies which result in wetting, emulsification, saponification and deflocculation of soil. Besides its solvent qualities, water also acts as a dispersal medium for the oils and particles which it will not dissolve, but which it can be made to carry in suspension. Further, it serves as a means for the application of heat energy and for applying the mechanical energy of agitation, all of which play a part in detergency.

The chief limitation of the ionizing solvents, such as water, as detergent agents is that they have no solvent effect on oils and greases. Such solvents are described technically as lipophobes (fat haters).

Another approach to the application of solvent activity in cleaning is the use of the second broad classification of solvents which do not split the substances they dissolve into electrically charged groups of molecules. Derived basically from petroleum, coal and wood, these solvents are unable to dissolve many substances which are readily soluble in water, but they do possess the ability to dissolve not only oils and greases but many resins, rubber, bitumens, paraffine and waxes. One of the fundamental advantages of the organic solvents is that they are capable of formulation into detergent agents which are chemically neutral, so that they offer a method for the safe cleaning of reactive metals, such as aluminum, magnesium, copper and zinc.

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Some of the most difficult problems in detergency, such as the removal of carbon deposits from internal combustion engines, and the stripping of paints and enamels are assigned to the organic solvents, such as Turco Fuze. The tenacious, intensely hard carbon deposits which form on engine surfaces are held together by resins formed during the combustion of petroleum fuels (Fig. 8). No available detergent has a direct solvent action on carbon, but certain organic solvents are capable of softening and dissolving the resins which bind the carbon particles together into masses and hold them to the surface. A similar situation exists in the removal of paint where the pigment is insoluble, but where the resinous bonding agent may be softened, swelled, or dissolved by the use of suitable solvents, such as those in Turco L-780.

Use of Organic Solvents

Remarkable work has been done with organic solvents to increase their emulsifying and penetrating power, and their ability to absorb soil without loss of cleaning power. Paint and carbon are usually present in successive layers. If the solvent is active on the upper layer only, repeated applications or prolonged immersion are required to complete the removal process. Properly formulated, the organic solvents can be made to penetrate through successive coatings and to break the bond which holds an entire mass of soil to the work.

A curious phenomenon relating to solvents is that a substance insoluble in either of two solvents individually may be readily soluble in a mixture of the two. Collodion, for example, is insoluble in either alcohol or ether, but will dissolve in an ether-alcohol mixture. In the same manner, a balanced mixture of detergents is required in almost every instance to remove the complex of soils found on any surface requiring cleaning.

pH and Its Control

pH is a yardstick for measuring the degree of alkalinity or acidity of water solutions. It is a measure of the energy but not of the amount of alkali or acid in solution.

When table salt dissolves in water a certain portion of it splits up into groups of electrically charged molecules called ions. Similarly, when hydrochloric acid dissolves in water it splits up (dissociates) into groups of chlorine and hydrogen ions. When the familiar alkali, sodium hydroxide,

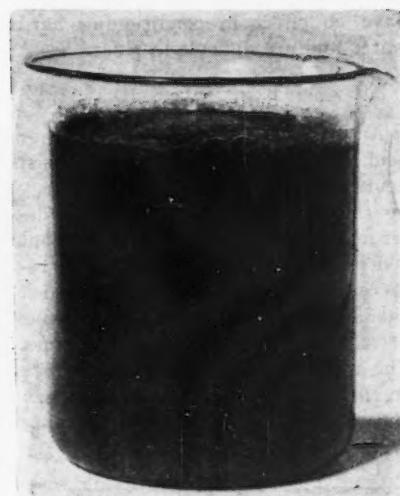


FIG. 7—Saponification chemically changes the insoluble oil to soluble soap. Note suds at top of beaker—evidence of a further reduction in surface tension resulting from saponification.

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dissolves in water it yields sodium and hydroxyl ions. All acids share in common the ability to yield hydrogen (H^-) ions in water solution. All alkalis yield hydroxyl (OH^-) ions in water solution. Alkalies and acids differ greatly, however, in the number of hydroxyl or hydrogen ions they release per given weight in a given volume of water. A fluid ounce of a 50 per cent hydrochloric acid solution would yield a far greater number of hydrogen ions than a fluid ounce of a 50 per cent solution of acetic acid. The acid which yields the greater number of hydrogen ions is more energetic in entering chemical unions with other substances, and is therefore described as a strong acid. The same distinction holds between strong and weak alkalies, except that the release of hydroxyl ions is responsible for the difference in activity. It may be concluded, therefore, that the concentration of hydrogen or hydroxyl ions determines the relative degree of acidity or alkalinity of a water solution.

Fundamentally, pH is a method of expressing mathematically the concentration of hydrogen and hydroxyl ions in a given water solution. It should be remembered that ions are groups of molecules, and that by comparison with the total volume of water their quantity is indeed very small. A typical measure of the concentration of hydrogen ions in a gram liter of solution may result in a fraction like this:

$$1/10,000,000$$

Obviously it would be difficult to

deal practically with such very small fractions. To simplify the expression of these values, a scale was devised that is based on the logarithm of the reciprocal of hydrogen ion concentration. Values so arrived at are known as pH values and may be arranged on a scale from 0 to 14, with 7 the neutral point. Values above 7 indicate degrees of alkalinity, values below 7 degrees of acidity. Both alkalinity and acidity become more intense as the values move away from the neutral point. Thus, pH 8 represents a weak alkaline reaction, a pH of 6 is a weak acidic reaction. At the other extreme, a pH of 1.5 would indicate a strongly acid solution, while a pH of 13.5 would represent a strongly alkaline solution. Each increment in pH represents a tenfold increase or decrease in acidity or alkalinity: pH 5 is 10 times more acid than pH 6; pH 4 is 10 times more acid than pH 5, and 100 times more acid than pH 6, and so forth.

Since pH is a method of stating the concentration of electrically charged groups of molecules, the most accurate method of measuring pH involves the use of a sensitive voltmeter which measures the electrical potential across the charged ions, and registers this in terms of pH values. This instrument is known as a pH meter.

Other means of determining pH are available that are based on color changes produced in certain substances exposed to alkaline or acid solutions. These materials are called indicators, the most familiar being litmus. Litmus has little value in pH determinations since it does not yield definite and sharp color changes for step by step increases in either acidity or alkalinity. Phenolphthalein, another commonly used indicator, changes in solution from colorless to pink at pH 8.3, and shows increasing color change to bright red at pH 10.0. Beyond this point, further increases in alkalinity do not increase the redness of the solution. A large number of indicators are now in use, whose value depends on a graduated color change within a fairly narrow pH range. In developing these indicators, the pH meter is used as a standard so that this remains the fundamental method of determining pH. The most sensitive pH meters now available, however, cannot discriminate between mild and heavy duty hot tank cleaners. Though these solutions may produce identical readings on the pH meter, their ability to remove grease, strip paint and

disperse solids may be vastly different.

The degree of acidity and alkalinity of a cleaning compound plays a part in rust and scale removal, in the etching and pickling of metal, in saponification and emulsification. Buffering, the means by which a solution resists a change in the degree of its acidity or alkalinity, requires accurate pH determination. pH readings are helpful in providing comparative data on the action of a given detergent, if all other conditions are under careful control.

Some of the most difficult jobs in

have no effect in conditioning hard water and are difficult to rinse.

Buffer Index

A carefully formulated alkaline or acid detergent is buffered to resist neutralization of its cleaning energy by the soil it removes. Such a detergent is not rapidly exhausted but continuously makes available a reserve supply of cleaning energy which enables it to absorb large quantities of soil over a long period of time. The mechanism of buffering depends on the release of additional hydrogen and hydroxyl ions in the cleaning

energy. Such a solution requires constant attention to maintain it at a functioning level since loss of efficiency begins almost immediately and is reflected in erratic cleaning performance.

In a properly buffered cleaner, on the other hand, the required degree of alkalinity or acidity is made immediately available and steadily maintained until the capacity of the buffer to release additional hydrogen or hydroxyl ions has been exhausted. The longevity of the cleaning solution, the amount of maintenance it requires and the uniformity of the results it produces are characteristics largely dependent on buffering.

To illustrate the practical significance of buffering, a record is given below of the pH readings obtained when measured amounts of a standard acid solution (1 normal sulphuric acid) were added to a solution of a hot tank aluminum cleaner, such as Turco Agiton:

The initial pH value was 11.76

1 Normal Sulphuric Acid	pH Value
1 cc.	11.76
2 cc.	11.5
3 cc.	11.17
4 cc.	10.82
5 cc.	10.56
6 cc.	10.27
7 cc.	9.8
8 cc.	9.58
9 cc.	9.13
10.0 cc.	8.71
10.5 cc.	8.53
11.0 cc.	8.39
12.1 cc.	8.1
12.4 cc.	7.99

It can be seen that it required 5 cc. of the sulphuric acid solution to produce a decrease of 1.19 in pH value, or 12.4 cc. of the acid to bring the solution from 11.76 to 7.99, nearly the neutral point.

Total Alkalinity or Acidity

In the discussion of pH reference was made to the distinction between the degree and the amount of alkalinity or acidity. The active alkalinity or acidity is a factor of the extent to which the detergent ionizes to yield hydrogen or hydroxyl ions. If the detergent dissociates completely during the course of the cleaning, the total amount of the acid or alkali in the detergent is gradually made available for useful cleaning work. On the other hand, if a considerable amount of acid or alkali fails to dissociate or become active, it merely represents so much inert material or filler which plays no part in cleaning and which is a source of rinsing difficulties.

the field of detergency, the stripping of paint from reactive metal and the removal of carbon deposits, are assigned to solvents in which ionization does not take place, so that their pH is equivalent to that of water.

The detergent effect of a compound is not determined merely by the acid or alkaline strength of the solution. If this were the case raw caustics, such as sodium hydroxide, should be among the most efficient detergents known. Yet research and experience show that such materials are relatively ineffective as detergents. Their potency is rapidly exhausted. Deficient in wetting properties they are slow in initiating cleaning action. They

solution to compensate for the ions neutralized in the cleaning work. Buffering may be compared to the functioning of a bank which provides funds to meet immediate withdrawals, and in addition maintains a reserve on which to draw to meet future or unexpected current demands.

Raw caustics often possess high initial energy which is rapidly vitiated in cleaning. When sodium hydroxide dissolves in water it dissociates completely into sodium and hydroxyl ions. Acids in soil combine with the available hydroxyl ions. However, no additional hydroxyl ions are released to replace them. The result is a progressive depletion of cleaning



FIG. 8—An example of one of the most difficult kinds of dirt to remove—hard baked carbon on an aircraft engine piston made of aluminum. The cleaning principle in this case is to dissolve the resinous material which binds the carbon particles to the metal and at the same time avoid a chemical reaction with the aluminum.

In the selection of a detergent, the criterion of value is not the amount of acid or alkali by weight or volume which is offered but the extent to which the acid or alkali can be made available for the removal of soil. A cleaning compound may consist entirely of alkaline substances, yet only as little as 10 per cent of this amount may actually be effective in removing soil.

In the formula of a scientifically balanced detergent the choice of each component can be justified in terms of the definite function assigned it in the cleaning job. Moreover, the components will not merely fulfill individual functions but will support and reinforce each other, so that the whole compound will be more active and more stable in cleaning activity than any of its parts.

If distilled water could be used in the make-up of aqueous cleaning solutions, many problems could be avoided. However, it is impractical to use distilled water in the tremendous gallonage required for industrial cleaning operations. Local natural water supplies are employed and these almost invariably contain dissolved bicarbonates and sulphates of calcium and magnesium. It is the presence of these minerals which is responsible for water hardness.

The fact that soaps lose much of their efficiency in the presence of hard water has long been recognized. Soap reacts with the dissolved magnesium salts to form insoluble, adhesive precipitates. The soap which takes part in this reaction is not available for cleaning; the gummy deposits pro-

duced resist rinsing and may form a more stubborn and more objectionable soil than the original dirt.

Even should the use of soap be avoided, in the presence of heat, calcium and magnesium salts tend to precipitate in the form of a thin film. Wherever a hot water rinse is part of a cleaning operation this film may be deposited. It is responsible for lusterless glassware, murky coloring in laundered textiles, and streaked, spotted metal. In a properly formulated and balanced detergent, provision is made for conditioning hard water to prevent the precipitation of minerals and the formation of film and scale. Further, the water softening and detergent functions of the cleaner are separate and distinct functions, so that detergency is not vitiated in the water softening process.

Dimpling Tool for High Strength Aluminum Alloys

A NEW tool for dimpling hard and brittle sheet metals such as Reynolds 301-T, Alcoa 75S-T aluminum alloys and the new lightweight magnesium alloys has been announced by the Glenn L. Martin Co., Baltimore, and will be soon made generally available through licensed tool manufacturers.

For a description of a similar technique developed by Douglas Aircraft Co., see "Avoiding Dimpling Failures in the New Aluminum Alloy, 75S-T," THE IRON AGE, Dec. 21, 1944, p. 38.

Known as the Martin spin dimpler, and developed by Hermann E. Veit of the Martin engineering division whose pressure pad dimpling tool for 24S-T and softer alloys is widely used throughout the industry, the new tool is used in a standard drill press and forms the dimple by spinning the metal rather than by pressing it into shape. In experimental use at the Martin plants, this tool has formed perfect dimples in both 75S-T and R-301-T in from 2-5 sec. per dimple and in cold AMC-52S-H in from 5-9 sec. per dimple. The same tool was used for both aluminum and magnesium alloys, but a lubricant was used with the form and omitted with the latter.

The actual spin dimpler consists mainly of four parts—a female die, similar to that used with a pressure

pad dimpler, into which the metal is spun; a male spinning tool; a trimmer cutting edge to remove any metal which is extruded upward during the

• • •

HERMAN VEIT, inventor of the Martin spin dimpler, examines dimples formed by the new tool. The tool itself, which is used in an ordinary drill press, is shown on the right.



forming of the dimple, and a pressure pad assembly for holding the sheet in place during dimpling. The spinning tool itself has several projections which are rounded off to eliminate machining of the metal from the inside of the dimple. To permit easy replacement, it screws into the pressure pad assembly shaft.

The spin dimpler is equally adaptable to any drill press capable of supplying 1500 r.p.m. spindle speed, and presents no undue problems for the unskilled or semi-skilled worker. Exact centering of the dimple is assured by a tip on the spinning tool fitting the inside diameter of the rivet hole.

Dimples formed by the spin dimpler feature a sharp edge similar to a machine countersink, leaving no void around the rivet head as in the case of the ordinary pressed dimple. Despite the fact that the cladding of the sheet is partially removed by the trimming edge, comprehensive laboratory tests have demonstrated that the spun dimple resists corrosion as well as a machine countersunk hole.

The spin dimpler has been used at the Glenn L. Martin Co. to form 100 deg. dimples for 3/32, 1/8, 5/32 and 3/16 in. diameter rivets in both aluminum and magnesium alloys varying from 0.020 to 0.064 in. thickness. In the case of aluminum Tycol-655 was used as a lubricant.

Spot Welding Of Magnesium Alloys

. . . In the second and concluding part of the article the authors report on the results of tests of many cleaning agents before a chemical cleaner was developed that is comparable in its effect to wire brushing, according to readings on a surface resistance meter devised at Fort Worth. Relative effectiveness of chemical protective finishes applied after spot welding is also revealed.

PART of the research program at Fort Worth involved the search for a suitable chemical cleaner to prepare magnesium alloy sheet for spot welding purposes since the magnesium sheet must be free of oil, grease or dirt, any chemical protective coating or any oxide or other film. It is well known that the electrical surface resistance of the metal to be welded must be low, requiring careful cleaning procedures. A cleaning method to prepare magnesium for painting, chemical treatment or other processes may not be an adequate cleaning method for spot welding. Heretofore, the only cleaning method recommended for preparing magnesium alloy for spot welding has been mechanical cleaning (wire brush buffing wheel). Such a method is slow and requires considerable expenditure

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Research Laboratory Analyst
and
N. H. SIMPSON
Chief Chemist
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Fort Worth, Tex., Division

of labor if a large amount of spot welding is to be done. Hence, there have been several attempts to develop a chemical cleaner that would clean the surface, remove any previously applied coating and leave the surface film-free with a low electrical surface resistance.

During the development of the chemical cleaner, electrical surface resistance measurements were made with the apparatus shown in Fig. 11. (See Appendix for wiring diagram of the meter and an explanation of the procedure for making readings.) The principle of the meter is that of the recognized method of measuring resistance by connecting in a current source a known resistance and the unknown resistance in series. By measuring the potential drop across the known resistance, the resistance of

the unknown resistor can be readily calculated.

The major portion of the magnesium alloy treated by the various experimental cleaners had a chrome pickle finish. This finish can be removed by immersing the alloy in a hot caustic solution for several minutes, but this alkaline cleaner leaves an oxide film that is more detrimental to spot welding than the chrome pickle finish. The main problem was to find a suitable acid that would remove the oxide film and leave a surface of low electrical resistance.

The caustic solutions tried were sodium hydroxide, potassium hydroxide, ammonium hydroxide and calcium hydroxide. It was noted that the type of caustic used had little effect on the final condition of the magnesium, provided that the caustic removed all the chrome pickle. Ammonium hydroxide was effective. Calcium hydroxide was thorough but slow; sodium and potassium hydroxide were of equal value. Either sodium or potassium hydroxide was the most effective in removing chrome pickle. Five per cent sodium hydroxide used at 150 deg. F. was selected as the best concentration and temperature for the caustic solution.

Results of Acid Tests

In the initial stages of the program, the relationship of surface resistance to spot welding quality was first determined by the following methods of cleaning:

- (1) Wire brushed only.
- (2) Wire brushed, then chromic acid treated.
- (3) Wire brushed, then nitric acid treated.
- (4) Wire brushed, then citric acid treated.
- (5) Treated in hot caustic only.

Two sets of plates were cleaned by each of the above methods. First five 2 x 2 in. AMC52S-H plates were cleaned by each method and their electrical surface resistance determined. Secondly, a set of 1 x 4 in. pieces was cleaned by each method and was then

TABLE IV
Shear Strengths Compared with Surface Cleaning Methods
(Preliminary Tests)

Cleaning Method	Surface Resistance Ohms/Sq. Cm.	Maximum Current-Amp.	Shear Strength-Lb.	Appearance
Wire brushed only	0.0012	250	900	ok
Wire brushed and chromic acid	0.019	175	555	ok
Wire brushed and nitric acid	0.150	100	615	burned
Wire brushed and citric acid	0.256+	100	.530	burned
Caustic treated only	0.256+		(not weldable)	burned and no weld

FIG. 11
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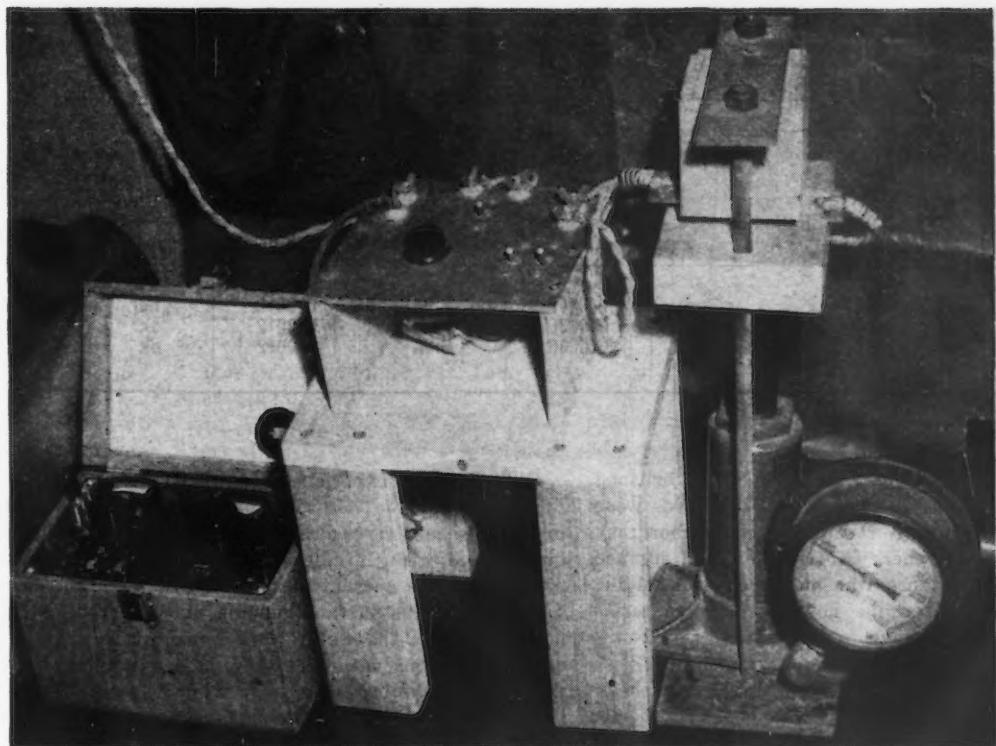
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FIG. 11—Setup for measuring electrical surface resistance of magnesium alloy sheets which have been wire brushed or chemically precleaned. See Fig. 18 for wiring diagram.



spot welded. A record was made of the maximum spot welding currents that could be used without "spitting" (see Table IV).

Next a number of acids were tried following caustic cleaning, including nitric, hydrochloric, sulphuric, phosphoric, chromic, acetic, citric, boric, tannic and carbolic acids. Various concentrations and temperatures of the above solutions were employed and a number of inhibitors were added in an effort to reduce the dissolving action of the acid on the metal.

Table V lists the surface resistance of five $2 \times 2 \times 0.064$ in. AMC52S-H plates, after various acid treatments. Each set of five plates was immersed in 5 per cent sodium hydroxide at 150 deg. F. for 5 min., rinsed and then treated at room temperature by one of the acid solutions listed.

One of the proposed cleaners (Dow Chemical Co.) was composed of 20 per cent chromic acid, 3 per cent calcium nitrate and 0.5 per cent calcium fluoride (see Table V). This solution left a relatively high surface resistance and also caused considerable action on the base metal. Citric acid was suggested but no concentration or temperature seemed to be satisfactory. The effect of high surface resistance can be seen in Table IV.

Nitric, sulphuric, hydrochloric, citric and acetic acids were very active on magnesium and considerable metal was removed when these acids were

used. The surface of the metal was usually badly etched and covered with a film. The treatment in phosphoric and boric acids tended to put on a dark colored coating, probably magnesium phosphate and borate, respectively. Chromic acid appeared to be the most promising and was subsequently utilized in developing a new cleaning process. Various concentrations and temperatures of the chromic acid were tried; the results of which are shown in Table VI.

The surface resistance of the wire brushed plates was 0.0012 ohms per sq. cm. as measured on the resistance meter, hence a 20 per cent chromic

acid solution at 150 deg. F. was selected as the best concentration and temperature, as this treatment left the magnesium with a surface resistance within the range of that of wire brushed magnesium. The time of chromic acid treatment was found to be very important. For an alloy that has had all the chrome pickle removed in the caustic bath, 2 min. in the chromic acid is recommended. Less time failed to remove all the oxide and longer caused over-etching.

Table VII compares the surface resistance increase with time after cleaning with either a wire brush or the chromic acid chemical cleaner.

TABLE V
Surface Resistance of Five $2 \times 2 \times 0.064$ in. AMC 52S-H Plates After Various Acid Treatments

Acid	Resistance Reading Millivolts	Surface Resistance Ohms/Sq. Cm.
10% nitric.....	20.0	0.081
1% sulphuric.....	7.0	0.028
10% hydrochloric.....	15.0	0.060
20% chromic.....	0.9	0.0036
20% chromic acid, 3% calcium nitrate and 0.5% calcium fluoride.....	4.5	0.018
10% phosphoric.....	39.5	0.159
Saturated boric.....	64.0+*	0.257
5% citric.....	9.1	0.037
5% acetic.....	15.0	0.060
Wire brushed.....	0.3**	0.0012

* 64 M.V. is the top limit of the potentiometer calibration.

** 0.3 M.V. is the lower limit of the surface resistance meter.

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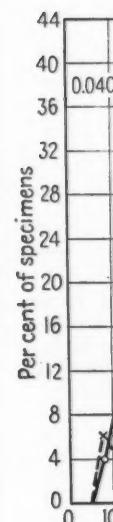


FIG. 14—
values
Fs-la alloy

following
finishes:

- (1) Ch
- (2) Ac
- (3) C.V.
- (4) C.V.

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TABLE VI

Concentration and Temperature of Chromic Acid Bath Compared with Surface Resistance of Five 2 x 2 in. AMCS-H Plates

Concentration of Chromic Acid	Room Temperature		150 deg. F.		Boiling	
	Resistance Ohms	Appearance	Resistance Ohms	Appearance	Resistance Ohms	Appearance
10 per cent.....	0.0048	Film	0.0012	fair	0.0028	fair
20 per cent.....	0.0036	Film	0.0012	ok	0.0012	ok
30 per cent.....	0.0036	Film	0.0012	ok	0.0012	ok

Chemically cleaned and wire brushed AMCS-H pieces of 2 x 2 in. were allowed to stand exposed to laboratory atmosphere and the electrical surface resistance was measured each 24 hr. to determine how soon the material would have to be welded after being cleaned by the respective methods.

Table VIII compares the shear strength of wire brushed and chemically cleaned spot welded magnesium on 0.040 in. AMCS-H magnesium alloy. Taylor-Winfield machine was used.

The appearance of the chemically cleaned plates was dependent upon the original condition of the surface. The alloy with an original bright chrome pickle finish resulted in a clear brilliant surface after cleaning. Surfaces with a dull appearing chrome pickle finish or surfaces that were etched or corroded resulted in a dull appearing surface after being chemically cleaned. However, even the dull surface had a low electrical surface resistance and welded satisfactorily. Hence, the appearance of the surface is no criterion as to how the material will spot weld.

Difficulty was experienced in welding Fs-la alloy. The welds on wire brushed sheet were either weak or burned, indicating excessive electrode pickup. If the current were reduced to a point where surface burning did not take place, the welds were weak or no weld was made at all. This situation was improved greatly when the Fs-la was chemically cleaned. Good solid welds were made although they were not as strong as those obtained with AMCS-O alloy.

Spot Weld Consistency

Later, tests were made to determine spot weld consistency of both wire brushed and chemically cleaned specimens to see how the spread in values

compared with the distribution of shear strength obtained in spot welding aluminum alloys like Alclad 24S-T. The distribution curves shown in Figs. 12 to 15 were produced by plotting the percentage of welds falling within each 50 lb. shear strength interval against shear strength. For all 0.040 in. gage specimens the Sciaky type PMCO-2S16 machine was used, while with the 0.064 in. and greater gage alloys, the large Taylor-Winfield type HWR-345DT unit was used. The same machine settings were used for all specimens of each set.

Observation of the curves, Fig. 12 to 14, indicate that the wire brushed magnesium alloy specimens had shear strength over a range of about 400 lb.

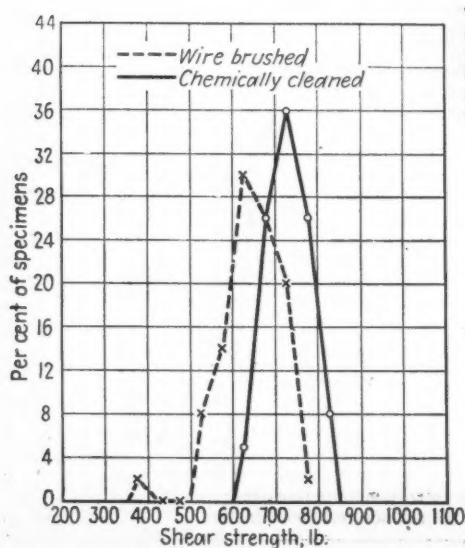
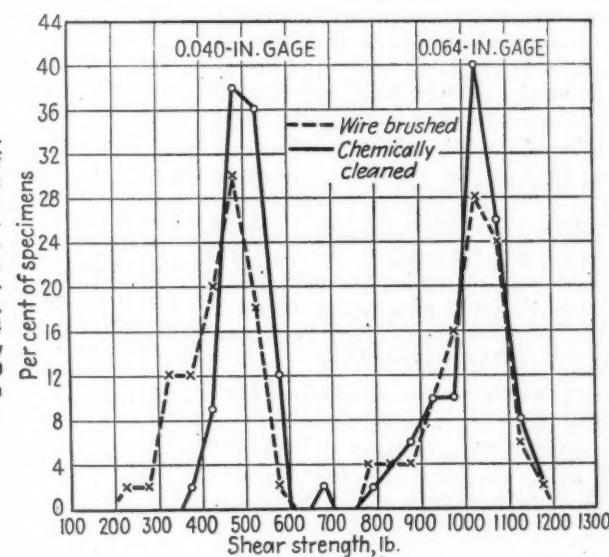


FIG. 13—Distribution curves of shear strength values of spot welds made in AMCS-H magnesium alloy. Number of test welds in wire brushed samples: 48 in 0.040 in. gage, 49 in 0.064 in.; chemically cleaned, 42 in 0.040 in. gage and 51 in 0.064 in. sheets.

FIG. 12—Distribution curves of shear strength values of spot welds made in 0.064 in. gage AM350 magnesium. Number of test welds: 50 wire brushed samples, 40 chemically cleaned specimens.



while the chemically cleaned magnesium specimens had a shear strength range of 200-250 lb. About 40 per cent of the latter welds fell within the mean value, whereas only 30 per cent of the wire brushed specimens had a shear strength equal to the mean. The chemically cleaned spot

welded specimens were nearly as uniform as Alclad 24S-T (see Fig. 15).

The Fs-la magnesium alloy produced relatively poor welds. All the wire brushed Fs-la alloy specimens would not weld without burning, whereas in the chemically cleaned specimens usable welds were produced. The chemical treatment referred to is the 20 per cent chromic acid dip at 150 deg. F., following an immersion in a 5 per cent sodium hydroxide solution at 150 deg. for 5 min.

Value of Protective Finishes

In order to test the effectiveness of various protective treatments, samples were spot welded and then given the

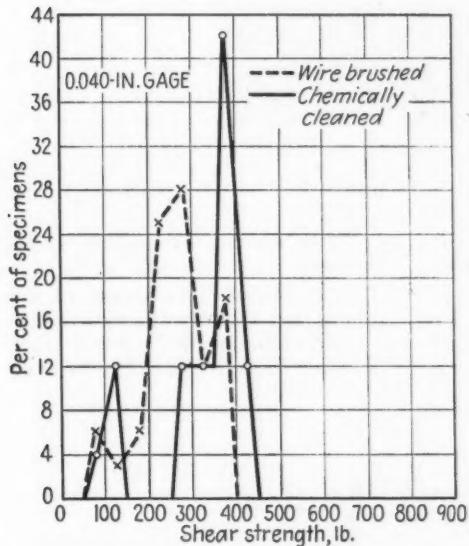


FIG. 14—Distribution curves of shear strength values of spot welds made in 0.040 in. gage Fs-la alloy. Number of spot welds: 32 wire brushed samples; 24 chemically cleaned.

following chemical or electro-chemical finishes:

- (1) Chrome pickle.
- (2) Acid dichromate.
- (3) C.V.A.C. No. 1 AC.*
- (4) C.V.A.C. No. 1 DC.*

* See "A Surface Finish for Magnesium Alloys," THE IRON AGE, Oct. 5, 1944, page 54.

The uniformity of the coating on the surface of the spot weld button was observed and the welds torn apart to determine the degree of penetration of the treatments into the overlapped area. The results (see Fig. 16) indicate that none of the treatments except the C.V.A.C. No. 1 penetrate between the overlapped areas. The acid dichromate and chrome pickle were very poorly coated between the sheets and in some instances no coating at all was deposited.

The C.V.A.C. No. 1 coating was uniformly dispersed up to the fused zone between the sheets although considerably thinner than on the outer surfaces. The better throwing power of the anodic process is to be expected.

Such a penetration is an advantage as a protection against the corrosion from moisture, salt water or other corroding media which may be trapped in the joint.

This is brought out in the photographs of the corrosion tests, Fig. 17. The plain specimens without any surface protection of any kind were removed after 48 hr. and the acid dichromate and C.V.A.C. No. 1, after 250 hr. None of the spot weld buttons showed excessive corrosion, indicating that no additional precaution, due to electrode pickup, is necessary. It has been suggested by many investigators that magnesium spot welds be wire brushed or otherwise mechanically cleaned after spot welding. These tests indicate, however, that such precautions are not necessary, if proper spot welding procedures and protective treatments are employed.

Appendix

The operation of the electrical surface resistance meter illustrated in Fig. 11 is based on the recognized method of measuring resistance by connecting a current source in series with a known resistance and an unknown resistance and comparing the potential drop across each. The circuit diagram of the instrument is shown in Fig. 18. The 6 volt battery supplies current through the main heavy lined circuit which is adjusted by the resistors, R_1 , R_2 , R_3 , R_4 and R_5 . The total

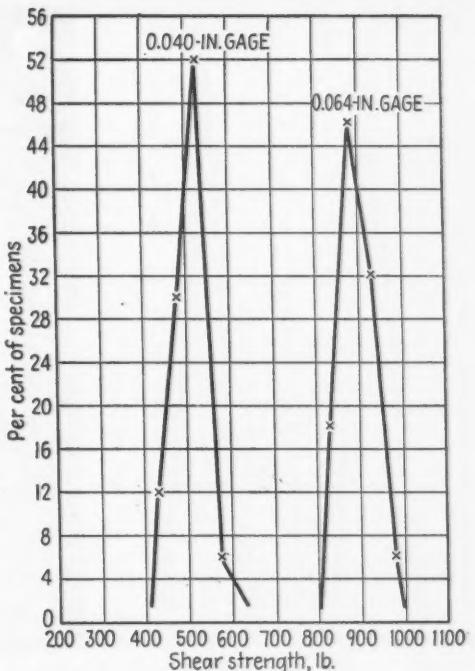


FIG. 15—Typical distribution curves of shear strength values of spot welds made in Alclad 24S-T aluminum alloy are shown for comparison with Figs. 12-14.

resistance of this parallel resistance circuit is varied from 6.25 ohms to 7.80 ohms by adjusting R_1 with S_1 closed, and from 7.2 ohms to 9.2 ohms with S_2 open. Switch S_3 is utilized to place the potentiometer across either the fixed wire wound resistor R_1 or across the electrodes P_1 and P_2 . The five 2 x 2 in. magnesium alloy specimen plates to be measured are placed between the electrodes P_1 and P_2 , and a compression force of 180 lb. (100 lb. per sq. in. hydraulic pressure) applied.

The procedure for measuring the surface resistance of cleaned magnesium alloy is as follows:

- (A) Balancing the apparatus for "zero" reading:
1. One sheet of 0.064 in. wire brushed magnesium alloy is placed between the two copper plate electrodes and the hydraulic

TABLE VII
Increase of Resistance Due to Exposure to Atmosphere After Wire Brushing and Chemical Cleaning

Time Hr.	Surface Resistance in Ohms/Sq. Cm.	
	Wire Brushed	Chemically Cleaned
0.....	0.0012	0.0012
24.....	0.0036	0.0012
48.....	0.033	0.004
96.....	0.256+	0.024

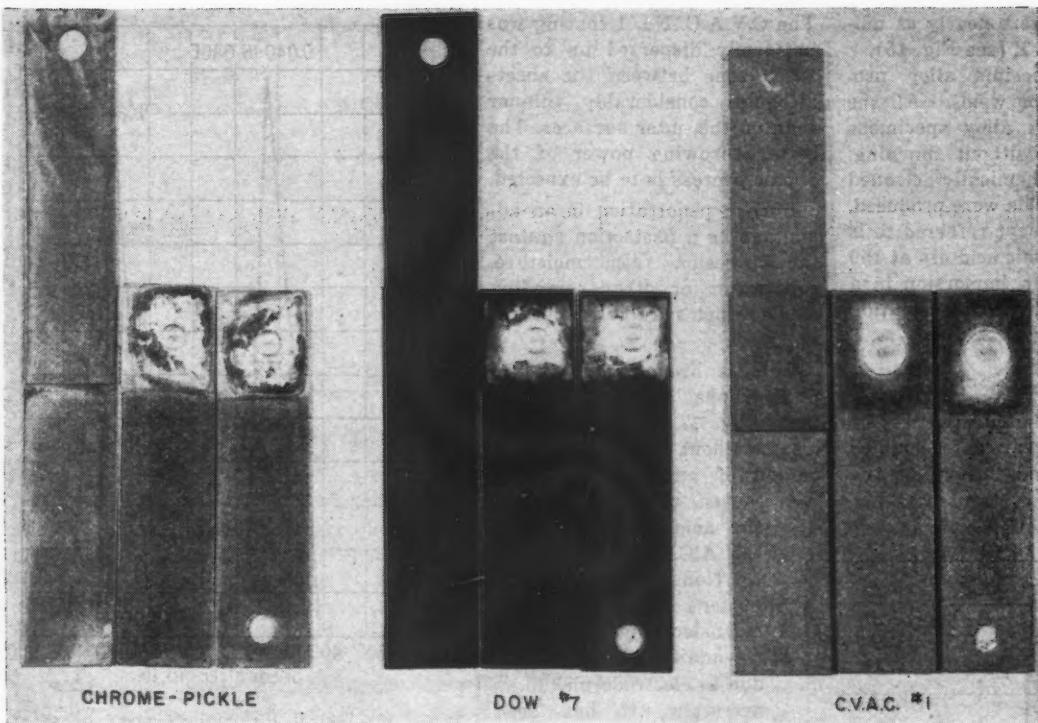


FIG. 16—Comparative penetration of three protective chemical finishes applied after spot welding AMC52S-H magnesium alloy sheets.

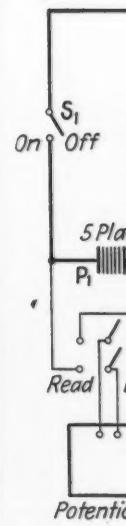


FIG. 18—Voltage measurement circuit for determining surface resistance.

- jack adjusted to 100 lb. hydraulic gage pressure.
- The switch S_1 is placed in "balance" position.
 - The potentiometer is set on 40.0 millivolts.
 - The parallel resistance circuit, controlled by switch S_2 and vari-

- able resistor R_e is adjusted until the potentiometer gives a null reading on the galvanometer.
- Switch S_2 is switched to "read" position.
 - Potentiometer is adjusted and number of millivolts recorded as the "zero" reading.

(B) Determination of surface resistance:

- Five plates to be measured are inserted between the two copper electrodes and the hydraulic jack adjusted to 100 lb. hydraulic gage pressure.

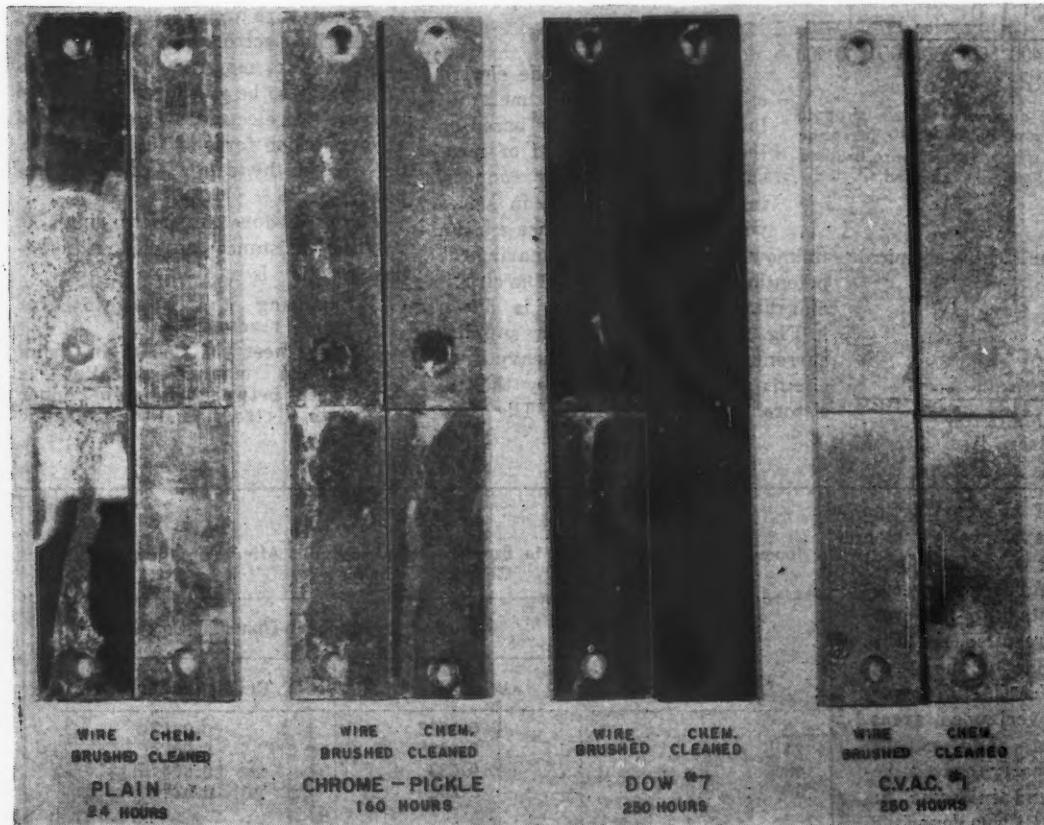


FIG. 17—Results of salt spray corrosion tests on spot welded specimens of AMC52S-H magnesium alloy.

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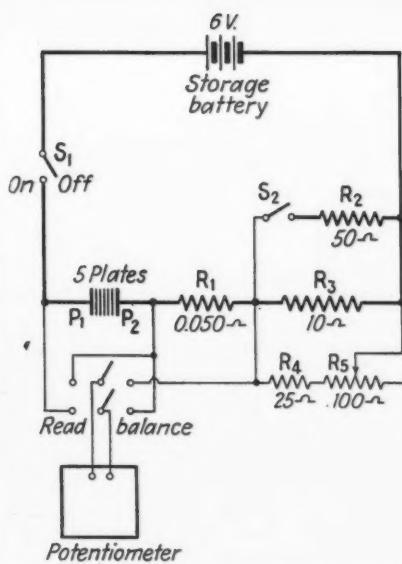


FIG. 18—Wiring diagram of surface resistance meter developed to measure the effectiveness of various cleaning methods on magnesium alloy sheet prior to spot welding.

2. Steps 2 to 6 of the above procedure are repeated and the number of millivolts recorded as "reading." The zero reading indicates the connections, wires, electrodes, and surface resistance of the electrodes and must be

subtracted from the "reading" value to derive the surface resistance of the sheets.

The surface resistance is calculated from the millivolt readings as follows:

$$\begin{aligned} \text{Resistance} &= \frac{\text{Potential difference}}{\text{current}} \\ &= \frac{\text{M.V. readings}}{1000 \times \text{amperes}} \end{aligned}$$

With a 40 millivolt drop across the 0.050 ohm fixed resistor, 0.8 amp. flowed through the plates. Since the reading is for four 2×2 in. plates (8 surfaces), the surface resistance per square centimeter in ohms would be:

TABLE VIII
Comparison of Wire Brushed and Chemically Cleaned 0.040 In. AMC 52S-H

Voltage	Shear Strength, Lb.	
	Wire Brushed	Chemically Cleaned
1700.....	175	302
1800.....	300	360
1900.....	350	410
2000.....	400	420
2100.....	450	465
2200.....	480	560
2300.....	540	680
2400.....	(Cracked) 650	(Cracked) 610

$$\text{M.V. reading} \times 2 \times 2 \times (2.54)^*$$

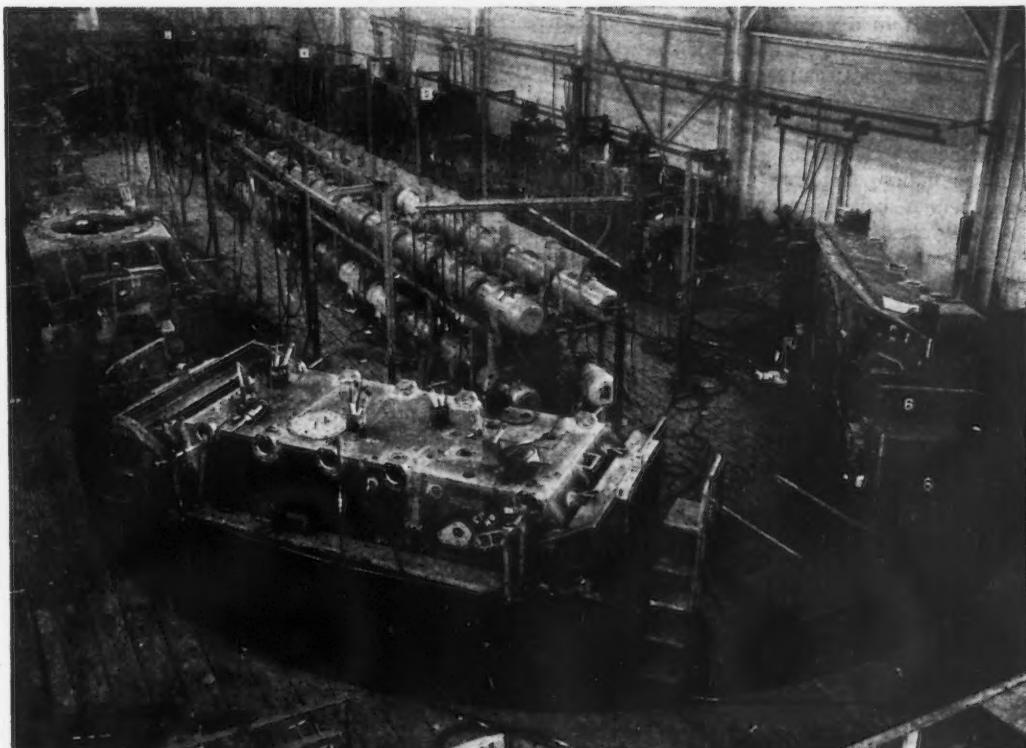
$$1000 \times 8 \times 0.8$$

$$= \text{M.V.} \times 0.00403$$

The calculation of surface resistance is based on four plates, rather than five, because one plate is accounted for in the zero reading.

Readings could be reproduced to an accuracy of 0.1 millivolt which is equivalent to 0.004 ohms per cm. which is a rough measurement of the surface resistance but sufficiently sensitive for these tests. The resistance of the metal was disregarded as it was equal to 1.26×10^{-7} for the four pieces of magnesium.

WELDING of M-24 tank hulls at Cadillac Motor Car Division is largely done in the down-hand position on this merry-go-round loop. The hulls are mounted in trunnion positioners which permit them to be rotated about a horizontal axis while they are being slowly carried around the oval island in which the welding generator sets are located.



Industry Views

Tool Engineering Education

... Industry thinking along the lines of tool engineering education is far ahead of what technical colleges and other educational institutions are now able to offer, according to a recent survey conducted by the American Society of Tool Engineers. Of those replying to a questionnaire, 60 per cent indicated that a four year college course in the subject would be desirable. No engineering college is offering such a course at present, however. Few appear to be interested in doing so.

SINCE the last war when our production job was somewhat of a "fizzle" tremendous strides have been made in the know-how of manufacturing. This progress has manifested itself in a great improvement in our living standards, in a transportation, communication, recreation and home appliance equipment galaxy that awes the world. Still more recently we made it possible to catch up and surpass in two or three years what our enemies had been amassing for over 10 years.

How was all this done? One hears the reason or reasons attributed to labor, to industry, to our great productivity, to free men, etc. While all mentioned have played their important part the facts are that the wholly indispensable and primarily vital ability to do what we did and continue to do so was because there had been developed in this country through the science of tool engineering a manufacturing technique or techniques within a group of men, known professionally as tool engineers, the greatest degree of knowledge of how to produce in mass, with minimum effort and skill, the world has yet seen. The incredible thing is that this war tooling job was done despite a terrific shortage of men in this field. The ASTE

By O. W. WINTER
National Chairman, Educational and Training Committee
American Society of Tool Engineers

manpower survey of 1940 indicated a shortage of 1½ million men in the ranks of tool engineers, tool designers, toolmakers and machinists.

In 1932 a group of far sighted aggressive Detroiters working in the thick of this manufacturing evolution, sensed the need for the professional distinction of those so engaged. Out of this group the American Society of Tool Engineers was born. The society's phenomenal growth to cover 18,000 members in 15 years with 66 chapters in the United States and Canada amply attests to the vision and judgment of that original group.

A new branch of engineering was here. It comprised under the professional title of "Tool Engineer" the manufacturing executives and managers, the master mechanics, the tool designers and men in like capacities who were determining, selecting, designing, applying and developing the means of mass and interchangeable production.

As a means of studying and charting its professional course a national committee on education was formed in 1939. Most of the membership had "come up the hard way" through the "school of hard knocks." There existed, however, an awareness that those aspects of the field in the nature

of an art were rapidly evolving in a scientific direction, that manufacturing techniques were becoming increasingly complicated and that, as a result, it would some day be desirable or necessary to supplement the indispensable practical experience with formal technical education in an engineering college in the training of future tool engineers.

In the January, 1942, issue of the society's journal, "The Tool Engineer" there appeared an ASTE "Proposed College Course in Tool Engineering." It was hoped alert institutions and individuals would show interest. Some did.

Self-Satisfied Attitude

There existed, however, the too prevalent self-satisfied, ultra-conservative and ostrich-like attitude in our institutions of higher learning. Steeped in the moss covered tradition of the value of the mental gymnastics of calculus and higher mathematics for math's sake and the fact that most everything of importance in the field of mechanical engineering dealt with steam power anyhow, they were quite blind to what was going on all around them.

Some of the more alert schools had in the meantime installed degree courses in industrial engineering. Many of these courses served well to staff industry with managing executives in later years. Some engineering colleges even tried to renovate pitifully obsolete and inadequate school shops. Some succeeded, others were squeezed out by budget limitations or an atrophied viewpoint.

In the meantime we found ourselves at war and pitifully short of tool engineers. In keeping with the times there were included in the gigantic war training program courses in tool design and so-called tool engineering.

ASTE did many places successful.

In February all the engineers in the war industries to them the overall field of engineering tool design and its correct application cases instances preferred by the subordinates their ineptitude.

Most schools find suitable responded affably of assistance of all existing literature was largely up-to-date classroom efforts were projects as the New Department teaching materials.

What was the engineering lot of having courses of developing enough, while tool engineers same engineers formed of recommended tool engineers of the aforementioned College Courses also sent. Some schools did not even however, constructive character.

On the other hand, colleges, institutes teach what student will and convenience set out to do in industry was.

Question Two thousand sent to less engineers, 1,000 employ the preferred received. An indication interest by of the ultimate engineering questions though still

ASTE did what it could to assist. In many places this effort was most successful.

In February, 1942, ASTE surveyed all the engineering colleges engaged in the war training program outlining to them the society's concept of the overall field of the profession of tool engineering. It was discovered that tool design was being taught under its correct title but also labeled incorrectly as tool engineering. In most cases instructors from industry were preferred but often their knowledge of the subject was largely offset by their ineptness of teaching.

Most schools had been unable to find suitable teaching material and responded affirmatively to ASTE's offer of assistance. Immediately a review of all existing tool engineering literature was launched. A woeful lack of up-to-date text material suitable for classroom was discovered. Thereupon, efforts were doubled in assisting such projects as that now conducted with the New York State Education Department in preparing tool design teaching material.

What was happening was that our engineering colleges were offering a lot of hashed up "postage stamp" courses of a tool engineering nature, developing for the war effort, laudably enough, what amounted to "fractional tool engineers." In June, 1943, the same engineering colleges were informed of the society's ability to make recommendations on the best available tool engineering literature. A reprint of the aforementioned "Proposed College Course in Tool Engineering" was also sent. The response was pitiful. Some schools were still asleep, others did not even answer or argue. Some, however, evidenced some very constructive outlooks.

On the premise that engineering colleges, in the final analysis, will teach what industry wants, that the student will want what industry wants and conversely that the college will teach what the student wants, ASTE set out to establish proof of what industry wanted.

Questionnaire Sent Out

Two thousand survey letters were sent to leading industrialists and engineers, the men who select and employ tool engineers. From this preferred list over 500 replies were received. This response is not only an indication of courtesy and decided interest but is a further indictment of the ultra-conservatism of our engineering colleges. The replies to the questions speak for themselves although some comments have been

added for further clarification. The questions follow:

1. Do you believe that the science of manufacturing has progressed to and reached a complexity and importance enough to warrant the recognition of tool engineering as a separate and distinct branch of the engineering profession?

ANS. Yes 86%, No 14%.

This should be convincing enough.

2. Do you relate tool engineering as a branch of mechanical engineering or industrial engineering or separate and distinct by itself?

ANS. Separate 49%, ? 4%, Branch 47%.

Of those considering that if tool engineering could be considered a branch of anything the replies were split about equally between industrial and mechanical engineering with the former having the edge.

3. Recognizing that tool engineering proficiency in the past has had to be acquired primarily by practical experience, do you believe that valuable time could be saved in the typical self-made careers of most tool engineers by the application of modern scientific teaching and training methods?

ANS. Yes 93%, Undecided 4%, No 3%.

Out of those participating in this survey who were self-made successful men having never attended college this answer is as unprejudiced an answer as one could imagine. In view of this, both college graduates and graduates of the school of hard knocks heartily agree.

4. If so, should tool engineering be taught in fully-accredited engineering colleges giving engineering degrees, or in technical institutes that lie in the educational plane somewhere between high school and college?

ANS. College 51%, Both 22%, Technical Institutes 27%.

Need for both although a full fledged tool engineer can best be trained in a full college course. The technical institute can do a creditable job of taking them part way.

5. Would you consider graduation from a technical or trades high school a prerequisite to college tool engineering training?

ANS. Yes 64%, Undecided 2%, No 34%.

Desirable if available. Let's make technical and trades high schools more available.

6. Would you consider serving a regular apprenticeship in industry as a prerequisite to any tool engineering training?

ANS. No 42%, Undecided 8%, Yes 50%.

An even split of opinion. Desirable but not essential.

7. Would you consider graduation from a technical or trades high school a satisfactory substitute for a full industry apprentice term as a prerequisite to tool engineering training?

ANS. Yes 44%, Undecided 5%, No 50%.

Same as above. Either proper high school training or some industry training is highly desirable.

8. Do you favor, for tool engineering training, the cooperative system of education where industrial experience and school training are combined in alternating periods?

ANS. Yes 87%, Undecided 4%, No 9%.

No question here, let's do something about it.

9. Where cooperative training as such is not available, would you consider summer vacation work, inspection trips and college shops as an adequate substitute?

ANS. Yes 50%, Undecided 10%, No 40%.

It can be done. With further enlightenment on how—this answer would be more in the affirmative.

10. Do you believe training on equipment should proceed to manual proficiency or should the emphasis be on the know-how?

ANS. Know-how 66%, Both 14%, Manual proficiency 20%.

Know-how for an engineer.

11. Recognizing that any graduate engineer, before reaching any substantial proficiency, must serve his practical "internship" of some four or five years, do you think this period would be longer for young graduate tool engineers who have had proper pre-college training?

ANS. No 91%, Undecided 6%, Yes 3%.

It takes no longer to make a tool engineer, if started right.

12. Do you think that four years spent in college, taking a qualified and basic course in tool engineering, would be time well invested? That is, could one learn

(CONTINUED ON PAGE 143)

New Equipment . . .

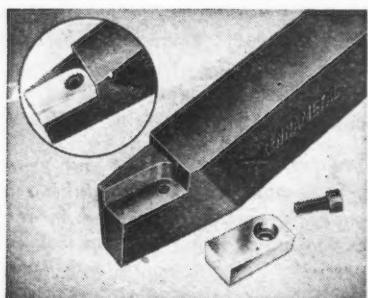
Small Tools and Cutters

... Recent developments in cutters, tool holders, marking devices, demagnetizers and fasteners are described in the following pages.

A SOLID cast cutting tool has been announced by *Crobolt, Inc.*, 1341 N. Main Street, Ann Arbor, Mich. The tool is produced by melting a special cobalt steel alloy in an indirect arc rocking electric furnace, super heating to well above 3000 deg. F. and casting in molds of the approximate tool size. This process is said to give the metal a preferred grain and carbide particle size at the time of casting, doing away with the need of forging and later heat treating. The tool bits are supplied hardened and ground, ready for use. They can be resharpened and used as long as the tool can be held in the holder.

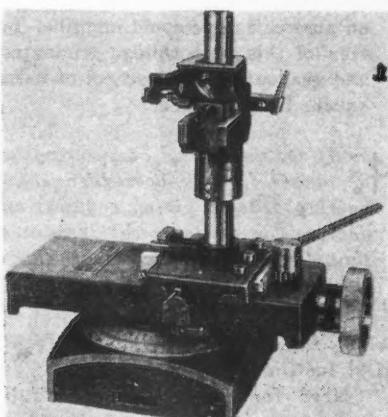
Screwed-On Tip Tool

A TYPE of Kennametal carbide tool blank having a drilled and counterbored hole to provide attachment to the steel shank by means of a recessed-head cap screw has been developed by *Kennametal, Inc.*, Latrobe, Pa. An annularly set screw holds the tip against the recess walls, which resist the main cutting thrusts. The blanks are available in several of the larger sizes with formed clearance angles and in all standard grades of Kennametal. Complete tools of various styled, straight edge, lead or separate standard blanks can be supplied.



Wheel and Tool Former

A WHEEL and tool former, designed to support tools to be formed on a tool and cutter or surface grinder without first forming the wheel has been announced by *W. F. Meyers Co., Inc.*, Bedford, Ind. The outstanding feature of the unit is its ability to grind precision radii on spiral fluted end mills and drills. Also this model, without tool attachments, will form similar outlines on grinding wheels with accuracy. A compound slide assures angles tangent to radii by simple manipulation. Vertical and horizontal diamond nibs are furnished for complete 180 deg. concave radii from 2 to 3/16 in. and convex radii from 2 in. to 0. Special vertical nibs can be furnished for forming smaller concave radii. The

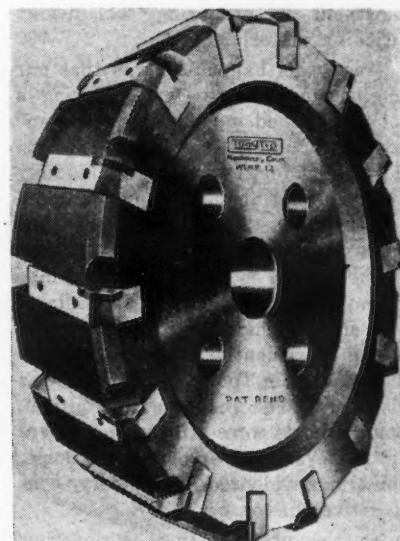


vernier graduated base is slotted and centered for flexibility of mounting on various machines and a dial graduated in 0.001 in. is said to assure accurate control.

Carbide Milling Cutter

A N inserted tooth milling cutter, which consists of carbide tipped inserted teeth rigidly locked into the tool body has been announced by the

Tungtip Div., Lowell & Grayson, Monrovia, Cal. This tool insert is provided with a precision flat back and serrated front face, which assures uniform clamping pressure over the entire length of the insert. An adjusting mechanism provides for precise adjustment of the insert



to within 0.003 in. eliminating rough grinding of inserts. Replacement inserts are provided with the face of the carbide finish ground and the cutting edges rough ground to reduce the user's maintenance cost.

Angle Forming Attachment

A RADIUS and angle forming instrument, the Radiform, has been developed by *W. F. Meyers Co., Bedford, Ind.* The device generates radii and angles tangent to radii on end mills, die sinking tools, drills, reamers, etc., both straight and spiral fluted directly against a grinding wheel without preforming the wheel. The collet holder is quickly centered

with a positioner. These are predetected and angles of accuracy are adjustment notch index, let holder both primaries.

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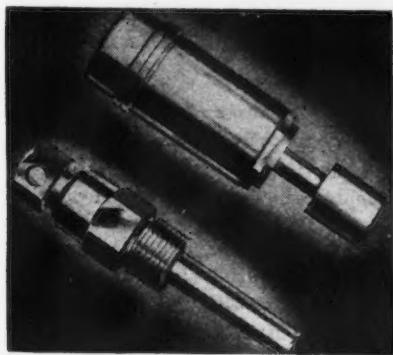
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NEW EQUIPMENT

with a positive stop. Clearance angles are predetermined as are the radii and angles to be formed. Extreme accuracy is assured by micrometric adjustment before forming. The 24 notch indexing head built in the collet holder permits the forming of both primary and secondary clearances.

Work Grips

THE addition of two new products, Grippets and index plungers, to its line of collet chucks, boring bars and standard drill bushings has been announced by *Universal Engineering Co.*, Frankenmuth, Mich. It is claimed that the Grippets lock work securely



in jigs and fixtures much more quickly than with two-action set screws and with much less cost and trouble than with cams. Installation consists of drilling and tapping a hole in the jig or fixture and inserting the Grippet. No special adjustments are necessary. It is claimed that the plungers used in jig and fixture work eliminate the machining of special indexing plungers for multi-station tools.

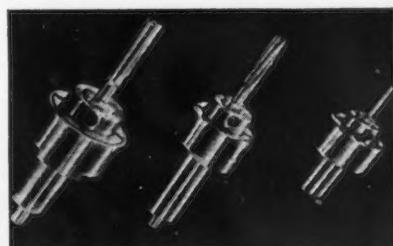
Grooving Tool

A GROOVING tool which can be used in any drilling or reaming machine operated automatically or by hand has been announced by *Waldes Koh-I-Noor, Inc.*, Long Island City 1, N. Y. The tool operates smoothly by fingertip pressure. Scratching or marring of work is prevented by ball bearing housings which hold the pilot housing. A concentric recess is assured. A vernier thimble controls the diameter of the groove. Positive non-slip drive is obtained because cutters have a tapered splined hole fitting a tapered cutter shaft.

Reamer Holder

A FLOATING reamer holder for automatic screw machines has been announced by *Green Mfg. Co.*, Rockford, Ill. On new or old ma-

chines the holder automatically compensates for any misalignment of the reamer and the drilled hole. There are no loose or moving parts or friction devices. The float principle is based on two synthetic oil resistant rubber rings. These allow free but controllable lateral or pivoted motion in any direction. Features of holder include a one-piece bushing which is



said to eliminate trouble resulting from mismatching or loss of parts.

Precision Counterbores

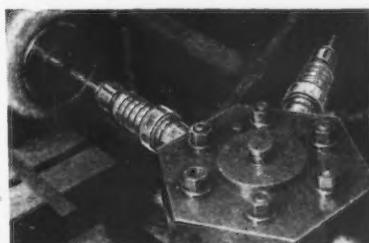
ADJUSTABLE to 0.001 in. over a range of approximately 1/32 in., adjustable precision counterbores have been announced by *Precision Mechanical Laboratory*, 119 West 63rd Street, New York 23. The counterbores can be run either right or left hand. The adjustable feature allows the bit to be reset even after many grindings to the desired recess size retaining extreme tolerances on both standard and non-standard diameters. Small machine screw head diameters are accomplished with these tools. The counterbores with desired pilots are available in sizes from $\frac{1}{4}$ to 1 in. with either straight or tapered interchangeable shanks.

Screw Machine Stock Tube

SIENT stock tubes for automatic screw machines have been announced by *Corlett-Turner Co.*, 4011 West Lake Street, Chicago 24. These C-T tubes are engineered acoustically so that they eliminate the banging and clattering of bar stock revolving at high speed in the machine. It is claimed that in closely packed screw machine departments, even when machining hexagonal, square or other noisy bars, it is possible to carry on a conversation in a normal voice where these silent stock tubes are used.

Screw Machine Air Drills

A LINE of air drills designed for use on hand and automatic screw machines has been announced by *Keller Tool Co.*, Grand Haven, Mich. The drills can be mounted in the reg-



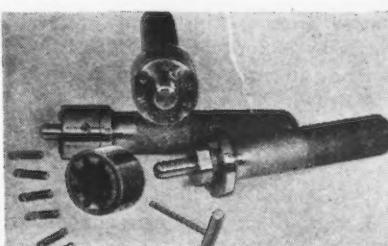
ular tool holders of automatic or hand screw machines. Compressed air is fed to the drill through a valve arrangement which opens as the turret moves forward and closes immediately when the turret is backed away from the work. The drills are available in three sizes and eight models, having speeds of 1200, 2800 and 3500 r.p.m. Drill capacities range from 1/32 to $\frac{1}{8}$ in. All tools are powered by the Keller standard rotary vane type pneumatic motors.

Tube Marker

FOR marking round tubes, bars, pipes, rods, etc., with a repeated impression, Rolamarker P has been announced by *Adolph Gottscho, Inc.*, 190 Duane Street, New York 13. The die cylinder is preceded and followed by V-rollers for guiding the impression to the top of the round metal piece. With these it is not possible to run off the top of the tube or pipe. For changes in diameter there is a simple adjustment made by means of opening a wing nut, setting an indicator and then tightening the nut. Four models are available, depending upon whether or not dies or type are stationary or interchangeable and what diameter range is to be covered, from $\frac{3}{8}$ to 2 in., or from $\frac{3}{4}$ to 3 in.

Annular Marking Stamp

AHAND stamping device for annular marking using several innovations in design to speed up marking in production has been developed by *New Method Steel Stamps, Inc.*, 147 Jos. Campau, Detroit 7. With this marker, the same size of type blanks and character for all small or large flat surface radii be-

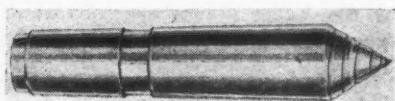


NEW EQUIPMENT

ing marked can be used. The device also eliminates the need for spacers inserted between the individual type characters. A feature of the design which makes the device particularly effective for such work as stamping dates on metal parts is an arrangement whereby a single character can be removed without disturbing the rest of the type. In addition, the marker lends itself to the accurate annular stamping of heat treat codes.

Grooved Centers

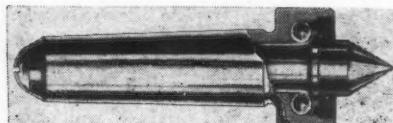
HELICAL grooved centers with cobalt-tungsten alloy tips which assure "red hardness" on even the most difficult cutting operations have



been announced by *Chicago Mfg. & Distributing Co.*, 1928 West 46th Street, Chicago. The abrasion-resistant cobalt-tungsten alloy is torch welded onto the center tip, midway from the point as illustrated.

Live Center

ALIVE center with ball race ground in the housing eliminating many separate parts and assuring accuracy that is said to be within 0.0002 in. tolerance has been announced by *Empire Tool Co.*, Detroit. It is claimed that the center will not bind even with heavy loads and that it will always run true. Because of the short overhang one can get closer to the work and there is less vibration and greater rigidity. A rawhide seal in the head prevents loss of lubricant and prevents foreign



matter from getting inside. Greasing is by a Zerk fitting. The center is made in sizes to fit Morse, Jarno and Brown & Sharpe tapers.

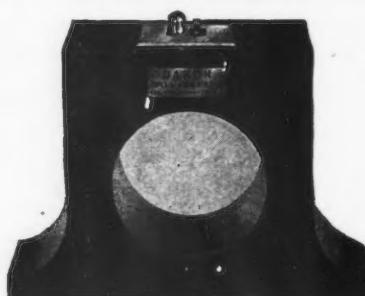
Rivet Gun

ACOMPACT, lightweight rivet gun, G-35, has been announced by *Cherry Rivet Co.*, Los Angeles.

Designed for installing rivets in hard-to-get-at blind spots, the riveter is operated with one hand, installs the rivet from one side of the job with a pulling force which eliminates the necessity of bucking the other side of the rivet. The gun measures only 11½ in. long, weighs approximately 1½ lb. and is well balanced for one hand operation. The pulling head is notched so that it snaps onto or off the gun quickly and easily, allowing greater gun flexibility and quicker head interchange. The heads are interchangeable for any standard Cherry blind rivet, aluminum, copper or steel.

Tool Demagnetizer

AN industrial demagnetizer called Mag-No which is an improved solenoid type of industrial demagnetizer has been announced by *Dakon Tool & Machine Co.*, 838 Broadway,



New York 3. No contact with the tool is required, eliminating scratching and greatly facilitating demagnetizing on a mass production scale. It is equipped with 8 ft. of cord and plug, switch and a pilot light which is readily visible in all directions to indicate when the demagnetizer is in operation. It can be supplied in any capacity, size or shape.

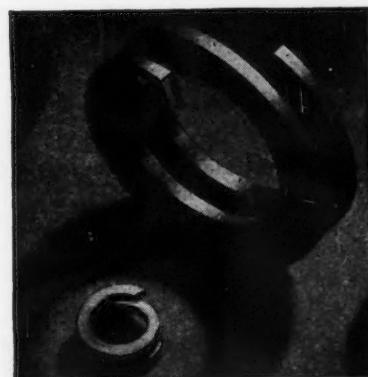
Turret Socket Wrench

AHOLDER accommodating four progressive sizes of wrenches for all makes of hollow head socket screws has been developed by *Micro Tool Co.*, 4 Sigourney Street, Hartford 5. The holders will cover all screws from No. 4 to 11½ in. Wrenches can be changed in the holder to use short or long end of the wrench.

Double Coil Washers

DOUBLE coil spring lock washers have been developed by *George K. Garrett Co.*, 1421 Chestnut Street, Philadelphia 2. The washers can be furnished in sizes for

No. 4 screws up to 1 in. and larger bolts in any desired finish. Each washer is "torture-tested" or subjected to more severe tests than will ever be encountered in actual use.



Fastener Assembly

AONE-PIECE fastener assembly, which does not require nuts or receptacles, has been developed by *Simmons Fastener Div., Simmons Machine Tool Corp.*, Albany 1. Called the spring lock fastener, it eliminates the need of lock washers and will not work loose from vibration. The fastener is of single piece construction and is self-adjusting to compensate for various material thicknesses within the range of the fastener and lock and unlocks with a quarter turn in a 90 in. clockwise rotation or can be permanently in-



stalled for use as a blind rivet. The construction of the head assures one-direction rotation for locking or unlocking. A quarter-turn puts the initial twist in the spring and another quarter-turn locks the fastener in place. Spring pressure pulls the sheets together, providing a tight, vibration-proof installation and high initial load without deflection.



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3. Apply large forces through continuous or intermittent reciprocating cycles at constant or variable velocities?
4. Obtain extremely accurate control of either position or speed of a reciprocating member?
5. Apply accurately variable pressure either static or in motion?
6. Closely synchronize various motions, operations or functions?
7. Apply light . . . or heavy . . . forces at extremely high velocities through either long or short distances of travel?
8. Obtain continuous automatic reversing drives at constant R. P. M. or over a wide range of speed variation?
9. Obtain accurate remote control of speed and direction of rotation, rates of acceleration and/or deceleration?
10. Obtain constant horsepower output through all or part of a speed range?
11. Obtain automatic torque control?
12. Obtain accurately matched speed of various rotating elements?
13. Obtain constant speed output from a variable speed input?
14. Obtain full pre-set automatic control, elimination of problems of shock, vibration, etc.?

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STANLEY H. BRAMS

• The detailing of the blueprint for automotive reconversion has begun, with hopes brightened for machines, tooling and plant clearances, resulting from visit of WPB heads to Detroit.



DETROIT—April showered the top production planning officials of the nation onto this war production and automotive center, and they turned the reconversion grass green. After a day of conferences between major automotive executives and officials of the War Production Board, headed by Chairman J. A. Krug, the outlines of the changeover to civilian production which will follow the collapse of Germany were defined a little more clearly.

Mr. Krug is in the key position for reconversion. A number of the less important government planning agencies, such as the War Manpower Commission, the Office of Civilian Supply, the Office of Price Administration, the Office of Contract Settlement, and others, play important roles, but the WPB is the key. Furthermore, WPB will be blamed if reconversion is slow and unemployment occurs, so it was no surprise that the board chairman accepted the automotive invitation with alacrity to talk things over, and brought his top advisers with him.

First, Mr. Krug laid down some of the basic ground rules. A date for automotive production will not be set, nor will quotas be issued, until after VE-Day. The actual go-ahead may come shortly thereafter, or "maybe some time after that." All production which will follow European victory will be subordinate to Pacific war needs. Present planning is on

the basis of a 12 per cent cutback in war orders during the first quarter following Germany's collapse, an increase to a cumulative total of 20 per cent in the second quarter, to 30 per cent in the third quarter and to 35 per cent in the fourth quarter.

The major questions on the agenda of the automobile people involved machine tools, facilities which will be needed for at least limited production, the prospects for materials, and the availability of tooling.

To handle these and other questions which may arise, the WPB announced the creation of a special task committee to operate in the Detroit office under the direction of Henry E. Nelson, director of the WPB Aircraft Division, who will continue to hold that job while working on his special problem. His job will be that of a coordinator on reconversion rather than a Czar. He is charged with the duty of checking requirements laid down by the individual automotive companies, paring them to absolute minimum levels, and following through with Washington to supply as many of them as possible. The indication is that he will act as the liaison man for the auto industry with the Production Readjustment Committee, the Army, the Navy, and the other agencies involved in the civilian goods changeover.

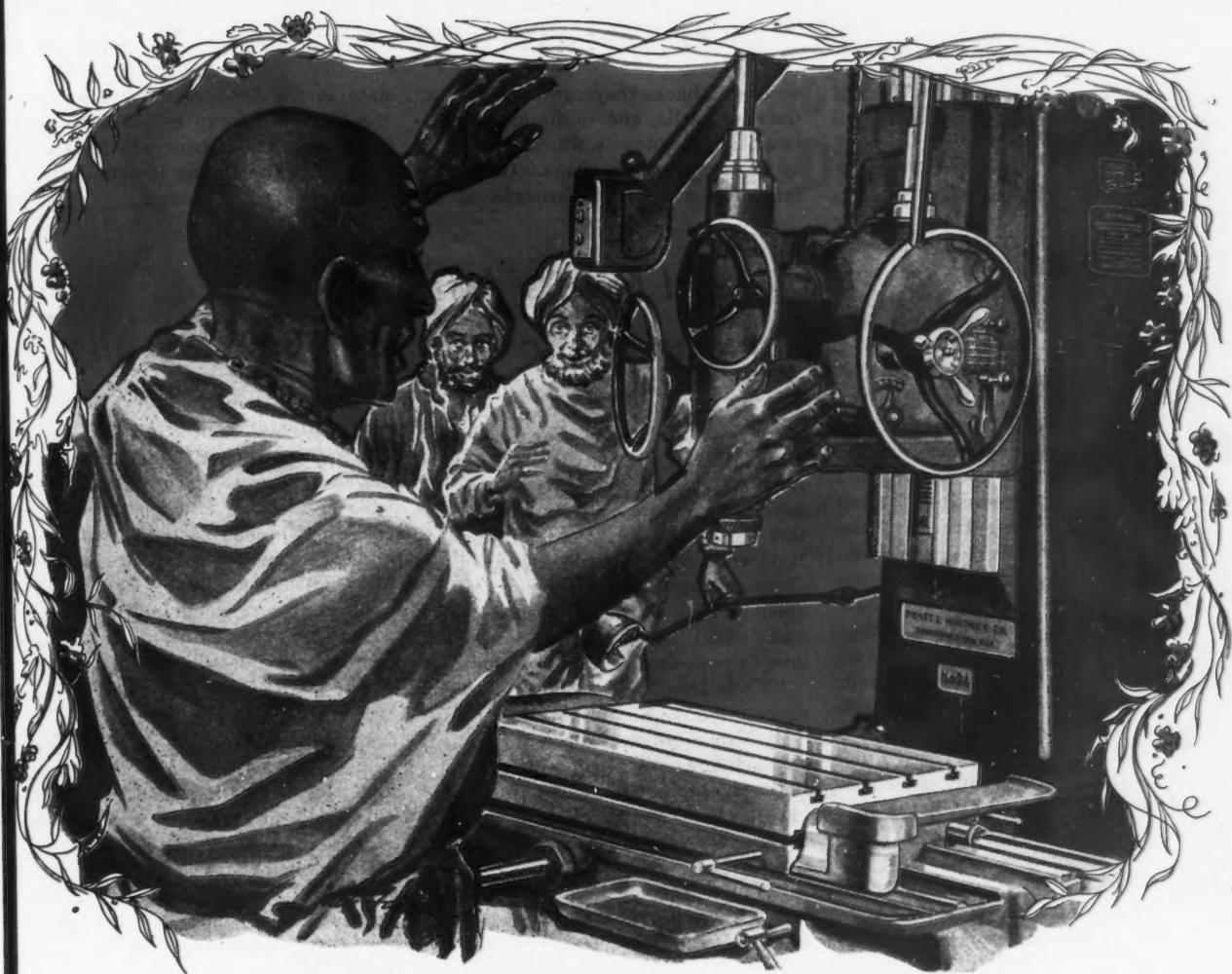
ON machine tools a general policy has already been laid down which has the effect of granting aid to the point of preference, without actually putting priority ratings on the machine tools which civilian industry will need for its comeback. Activation of this plan has been underway during the past few months under John S. Chafee, director of WPB Tools Division. It consists of a machine-by-machine study of orders on the books, and a forthcoming reshuffling of delivery dates wherever possible to meet the time requirements of all orders. That is, if a civilian machine tool is needed before a highly rated machine is actually required for war work, that civilian equipment may displace the higher rating in the order of production. Mr. Chafee's division has a man-size job on its hands, because the automotive industry requirement alone is for

5085 machine tools beyond those expected to be obtained from DPC, the services and SWPA, with approximately 190 companies involved as suppliers. However, Mr. Krug expressed optimism over the working out of this job, saying deliveries would be assured when needed. It might be added that the general line laid down by Mr. Krug at the Detroit meeting was that these civilian reconversion orders will take precedence over non-military lend-lease commitments.

The auto people also are calling for an approximate \$25,000,000 in facilities, mostly small construction. A thin start will be made on this program very shortly, and it will bloom to full size as soon as Germany collapses.

These concrete requirements could be discussed at the meeting more substantially than could the rather nebulous problem of how to clear out automobile plants of war contracts. The general approach which will be attempted on this is the return of sub-contracts of the automotive companies to their prime contractors wherever feasible—a program which will gradually release the weighty aircraft jobs which constitute the largest monopolizers of auto plant space. Henceforth, Mr. Krug indicated, the Production Readjustment Committee will likely expand its original concept somewhat and act not only to make the most efficient use of all facilities, but also to transfer out of automotive plants as logically as possible any contracts which can be sent or returned to prime producers in other fields.

As for make-ready tooling, there has never been any bar to this in the tool and die companies except manpower ceilings which were being lowered when workers were put on non-military orders, and materials which they could work. The comparative trickle of iron and steel required for this work will probably be allowed before too long, and Mr. Krug is expected to confer with WMC people to see what can be done about making manpower available for reconversion requirements. This will depend on the attitudes taken by various Production Urgency Committees in Detroit and other areas; if the rating is



VISHWAKARMA ... the Blessing of the Machines

From far off India comes an interesting report by the toolroom foreman of a large industrial plant. Once a year, a day is set aside for the annual VISHWAKARMA festival wherein blessings are invoked upon the factory equipment.

According to ancient custom, a fire is lighted in the morning into which various foods are scattered as an offering. In the afternoon the residue is used to mark the machines with various religious signs, while a Brahmin performs the blessing.

One by one the machines are then gaily decorated with flowers, garlands, and flags and are pronounced

ready for operation during the coming year.

What particularly interested us at Pratt & Whitney is the fact that several of our jig borers were among the machines so blessed . . . one more illustration of the extent to which Pratt & Whitney accuracy is in service throughout the world.

For regardless of geographical location, regardless of the conditions under which work is performed and the workers who operate the machines—*there is no substitute for accuracy*. For 85 years, this has been the prime requisite of every P&W machine tool, small tool, and gage.



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high enough—which it probably will be in Detroit, at least—transition will probably be effected.

SURPRISINGLY enough, very little was said about actual car production at this meeting. The automobile people themselves were much more interested in what they termed pre-reconversion planning, than in conversation about when automobile production may be allowed and to what extent. It was quite obvious that on both sides the expectation is that a go-ahead will be permitted shortly after the collapse of Germany, and that the normal problems of starting a new model year, accentuated by the fact that there has been no automobile production now in more than three years, will in themselves guarantee a slow enough start so that materials will flow in sufficient volume by the time they are required. Mr. Krug tended to confirm this with his observation that late in the first quarter after VE-Day a filling of unrated orders will be permitted at material suppliers, and that in the following quarter it probably will be possible to do away entirely with the Controlled Material Plan in favor of an arrangement of simple priorities in which military needs will come first and suppliers will fill their orders in accordance with past practice.

Mr. Krug hazarded a guess that about 1,500,000 tons of steel will be available for civilian requirements in the first quarter after VE-Day. This was admittedly a loose figure, but probably would include somewhere around 250,000 tons of alloy steel. If anything, the figure can be construed as very conservative. Thereafter, availability of steel should expand quite rapidly. In fact, at this stage with anticipating German collapse in a matter of days, if not weeks, the automobile people are more worried about their chances of getting textiles for upholstery and rubber for tires than about their steel needs.

They are still figuring on a practical minimum production basis of around 2,150,000 vehicles for the first year after resumption of production is authorized, but—as before—it is generally anticipated that this theoretical minimum will give way to a much higher actual production figure once the light has turned green.

Planning for reconversion, consequently, is here. This week automobile companies began to meet in Washington with the Army and Navy Readjustment Divisions to get details

on the cutbacks they can expect when Germany falls, and to discuss the relocation of contracts which they wish to get out of their shops. Once this information has been brought up to

date in the forthcoming conferences, the last major gap in the undetailed reconversion blueprint will have been filled in. The spring is definitely becoming balmy in Detroit.

General Motors Actively Urging Foremen Not to Join; May Promote All

Detroit

• • • General Motors Corp. has declared frontal war on the move of the National Labor Relations Board to recognize foremen as eligible collective bargainers. A letter dispatched last week to the 20,000 foremen in General Motors Corp. made no bones about telling them that their position would deteriorate if they allowed themselves to become unionized.

"We believe," said the letter over the signature of C. E. Wilson, G. M. president, "that union representation of any management group will definitely limit the opportunities of the individuals in that group. In General Motors it would make it necessary to revise the management structure in a fundamental manner. Foremen would no longer be able to function as members of management. Hence their authority and responsibility would have to be changed."

Indications were that the corporation would make straw bosses out of their foremen in the event that organizational efforts by the Foreman's Association of America, independent, or any other union gained headway. It was not immediately made clear how the foremen would be replaced in such

circumstances in the General Motors organizational setup.

Wilson predicted in his letter that the consequences of successful unionizing of foremen would be "decreased efficiency, higher cost of production, higher selling prices and reduce employment opportunity." He said that General Motors would continue to oppose union representation for foremen in any plant by all proper and legal means.

The letter very plainly established desire or disinterest in collective bargaining representation as one index to supervisor ability. The letter said: "The qualities required in successful managers are individual ability, initiative and cooperation. It is these qualities that raise the value of their services above those of the people they supervise. Therefore, any member of management who requires an outsider to represent his interest does not have those required qualities."

The letter concluded with the hope that foremen would decide against joining a union for representation purposes and promised that "competent foremen with General Motors need not fear for their postwar future."

Contracts Total Is Over One Billion

Detroit

• • • A total of \$1,124,719,000 in war supply and facility contracts have been approved in the Detroit area during the first quarter of 1945 by the Production Urgency Committee. This compares with a total of \$2,783,883,710 in contracts approved for the entire year of 1944.

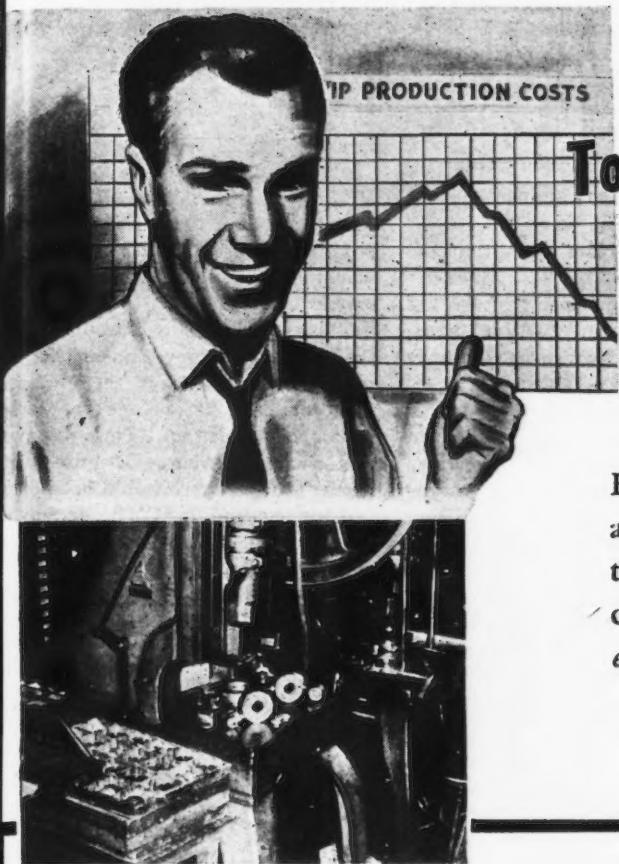
Of the totals approved during the first quarter, \$339,872,573 were continuing contracts involving no additional manpower. A total of \$681,476,592 was involved in war supply contracts and \$103,368,178 in facility contracts. These are prime contracts only, and subcontracts amount to several hundred million dollars more.

It was stated that regardless of what happens in Europe, much of the production authorized during the first quarter will be required for the Japanese phase of the war. The indication read into the awards by the Area Production Urgency Committee was that cutbacks in the district will not be as great as had been anticipated last fall.

GE Orders Up

Schenectady

• • • Orders received by the General Electric Co. during the first quarter of 1945 amounted to \$395,466,000 compared with \$391,901,000 for the corresponding period of 1944, an increase of 1 per cent, Charles E. Wilson, president, announced recently.



How This Tool and Die Job Analysis CAN BRING DOWN YOUR PRODUCTION COSTS

Here is a definite system for making tools and dies that last longer on the job. It cuts tooling costs as well as actual production costs. And the best part of it is that it's *easy to use!*

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Select your tool steel by proved standards. When you need properties like extreme toughness or extra wear resistance in a tool, use the Carpenter Matched Set Diagram to quickly point the way to the one tool steel that will do the job best. You can actually predetermine tool performance when you use this method. To find out more about it and the ways it can help to save time, tool steel and money, ask for the Carpenter "Matched Tool Steel Manual" described below.

Your 2nd Step:

Check up on heat treating methods. To help your heat treaters get proper hardening results, ask for Carpenter's Heat Treating Guide, free to tool steel users in the U. S. A. It's a handy slide chart that spots each steel on the Matched Set Diagram and gives forging heat, normalizing heat, annealing treatment, recommended drawing range, etc. It also contains tips on quenching, oxidizing atmospheres, etc. A note on your company letterhead will start your Guide on its way.

Your 3rd Step:

Check actual tool performance... as the first step to reducing machine shut-down time. You can cut tooling and production costs by keeping accurate records of the pieces produced between grinds, or before tools must be re-made. It's a sure way to keep tabs on your tool steel selection and heat treating decisions.

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This 167-Page Carpenter "Matched Tool Steel Manual" makes it easier to get every tool made right the first time. It contains an 80-page Tool Steel Selector indexed by kinds of tools. A flip of the pages shows the recommended steel for each type of tool. This Manual is free to tool steel users in the U. S. A., so for your copy, write us a note on your company letterhead.



The Carpenter Steel Co., W. Bern St., Reading, Pa.

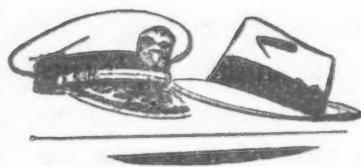
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Washington . . .

L. W. MOFFETT

• VE-Day cutbacks once more are outlined by WPB . . . Administration holds restrictions to prevent mass exodus from war plants.



WASHINGTON—Present tentative war contract cutback plans for the fourth quarter after VE-Day involve a direct reduction of munitions expenditures by 35 per cent; of carbon steel required by the Army, Navy, Maritime Commission and Aircraft Resources Control Office, by 38 per cent; and of alloy steel required for military purposes, 37 per cent.

The rate of expenditure for the current quarter is \$15,800,000,000. The foregoing war claimants received 6,500,000 tons of carbon steel in this quarter, and approximately 1,389,000 tons of alloy steel.

In the first quarter after VE-Day about 1,500,000 tons of carbon steel, and 264,000 tons of alloy steel will be released for such essential programs as petroleum production, public utilities, railroads, and the container industry. For the military services this is a 23 per cent reduction in carbon steel requirements, and a 19 per cent reduction in alloy steel requirements.

Thereafter, carbon steel requirements are reduced by 37 per cent for the next two succeeding quarters; the cutback in alloy steel for the second quarter is 23 per cent, and in the third quarter, 30 per cent.

This release of steel does not include "B" products, inventory adjustment, or supplies of steel that may or may not become surplus. However, outside of these sources of steel to be released for non-military production, the current estimate of carbon steel to be released within one year is

8,700,000 tons, and 1,514,000 tons of alloy steel.

Some WPB officials think that the foregoing amounts of steel to be released may be reduced by future hot weather, the lure of vacation lands, and a general letdown in productivity after Germany is defeated.

WPB Chairman J. A. Krug in his explanation of the Byrnes report on reconversion said that most consumer items would be purchasable in stores within the first year after VE-Day, but he did not make it clear how this is going to come about.

No public official has yet made information available to industry on exactly how cutbacks are to be worked out, nor has anyone said just what the demand of foreign countries for American goods for reconstruction purposes will be. Without such information, Mr. Krug's assurance that the first year after VE-Day will at least be comparable to 1939, when the civilian economy took approximately 40,000,000 tons of steel products, needs further explanation.

The war agencies are now taking approximately 46.4 of the estimated 16,055,000 tons of steel rolled per quarter. This means that the Army, Navy, Maritime Commission, and ARCO are taking about 29,838,080 tons of steel annually, leaving civilians with about 34,381,920 tons of steel.

On the surface, when the 10,214,000 tons of carbon and alloy steel capacity released during the year after

VE-Day is added to what is now called "civilian" steel, it would appear that more than 44,000,000 tons would be available for civilian economy.

This is admittedly speculation on the part of the government, because it may turn out that the Japanese War may end before one year after the Germans give up. Then reconversion would be a horse of quite a different color. There would not be any talk of continuing CMP, or having programmed civilian production with priority controls over materials, because the public would not stand for it.

However, unless the pattern of distribution in the present supply of civilian steel is changed after VE-Day, or unless the administration's grandiose plans for European reconstruction are modified, the 10,000,000 tons of steel to be released by the military will not be sufficient to restore civilian production forbidden by WPB orders, even on a 1939 basis. On the other hand, it is possible that the cancellation of "B" products may bring a reduction of at least 4,000,000 tons, and steel men talk of finding at least 5,000,000 tons of steel in the surplus category. If this happens, then it is quite probable that 1939 production levels may be reached and even surpassed, with more steel supplies turning on through "de-piping" or the adjustment of inventories.

In 1939, the automobile industry alone took nearly 6,000,000 tons of

PRE-CONFERENCE TALK—Andrei Gromyko, Russian Ambassador to this country (pictured in center) talks to reporters after meeting with Lord Halifax, Secretary Stettinius and Wei Tao-Ming at the State Department in Washington, recently.

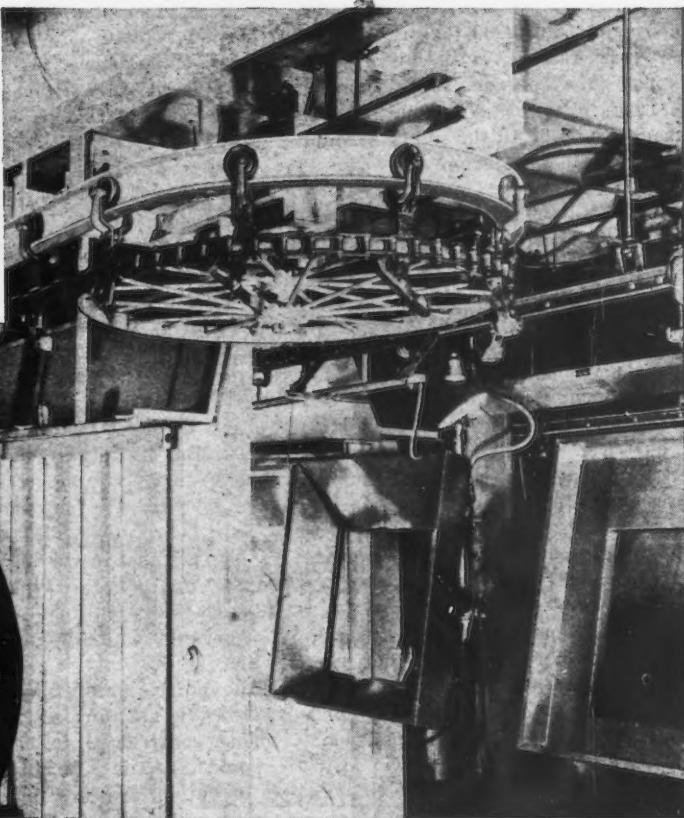


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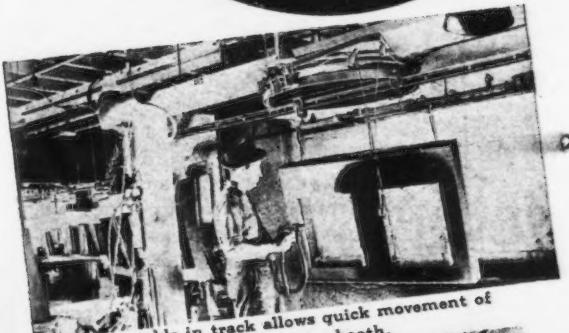


Storage bank on tracks assures supply of parts to sprayer.

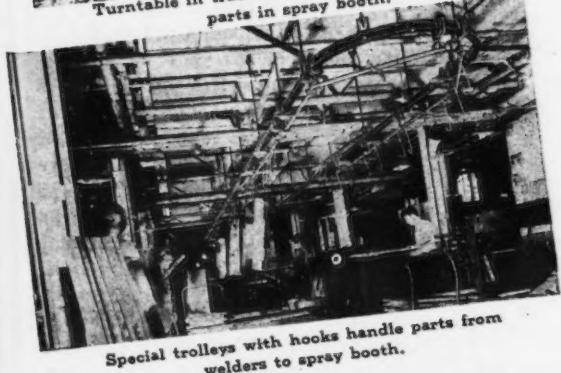


Pusher feeds sprayed parts through oven on monorail to wrapper.

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SYSTEM
**CARRIES PARTS FROM
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Turntable in track allows quick movement of parts in spray booth.



Special trolleys with hooks handle parts from welders to spray booth.

A well known furnace manufacturer has eliminated the bottle-neck in their enameling section with the use of infra-red drying and American MonoRail Overhead Handling System. Where casing sections would pile up in the spray booth, often requiring over 30 minutes—it now takes only 8½ minutes to bake the finishes.

American MonoRail synchronizes all pre-baking operations with baking time. The system extends from the sheet metal section, through spraying, baking, wrapping and returns to fabricating and welding stations. A turntable in the track permits reversing of carriers holding the pieces so that operator may spray all sides without touching the sprayed surfaces.

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WASHINGTON COMMENT

steel, and civilian construction took more than 6,000,000 tons of steel products; hard goods for the agricultural economy accounted for 1,500,000 tons of finished steel, while the household furnishing industries consumed more than 1,000,000 tons.

Other factors, with unforeseeable impacts may prevent a rapid civilian upturn in terms of consumer goods made available to the public. Figuring it will take from three to six months for most manufactures to reach the distribution stage, it is hard to see just how a whole year's output can be squeezed into retail outlets within six to nine months.

Questions that will have to be answered by the government, include one very important one—just how much longer will transportation, construction, public utilities and other industries, now designated as being civilian, have to continue on their present material supply basis? Will the railroads be able to get along with the freight cars they now have in the readjustment period?—is another.

While it is conceded that domestic industrial construction should be at a minimum, the government has been unwilling to reveal the extent of its commitments for supplying foreign reconstruction needs. The petroleum industry has expanded its well drillings for war; and it is questionable

whether bringing in further wells will be necessary to maintain the economy. Similar questions are pertinent to the future operation of utilities.

It is impossible to tell from information released by the government whether manpower will be in short supply, or in surplus, during the adjustment period. Taxes are supposed to be revised, but no comprehensive program affecting all segments of the public has been submitted to Congress. The OPA shows signs of trying to hold prices to the 1942 level, which with labor cost increases may hold up reconversion.

Affecting the way the whole reconversion of the country is going to get its start is the fact that preliminary cutback figures are probably not generous enough, many WPB officials feel. But since that subject goes into the realm of strategic considerations, the officials are not making themselves heard.

For instance, some officials feel that much production now destined for Europe should not be shipped there, but should be redirected to the Pacific.

Long cycle production projects such as heavy ammunition facilities now being constructed for European use should be halted, if not required for prosecuting the war against Japan,

these officials feel. But again, the War Department seems to think such cutbacks would be a gamble, although the completion of these projects is as much as a year away.

* * *

WORKING men in war industries should rely upon governmental promises of assistance in getting jobs to take the place of work discontinued by VE-Day cutbacks, so that military anxiety for production for the Pacific War does not force the government to slow down reconversion efforts.

To date this has been the great fear of the Secretaries of War and Navy, that there should be a great mass exodus from war plants needed to fight Japan, as soon as the word reconversion has official sanction.

Waiting for the government's policies to finally jell in the face of prospective unemployment, or unemployment itself, will indeed be difficult, particularly in view of the fact that the average worker feels that he should not look to a government bureau in Washington to provide him with a job, but should go get one.

If there is a sudden mad scramble to get out of war plants by employees whose services are still needed, the administration, frustrated by the Senate's defeat of manpower legislation, may feel forced to impose restrictions upon the return to a normal free economy.

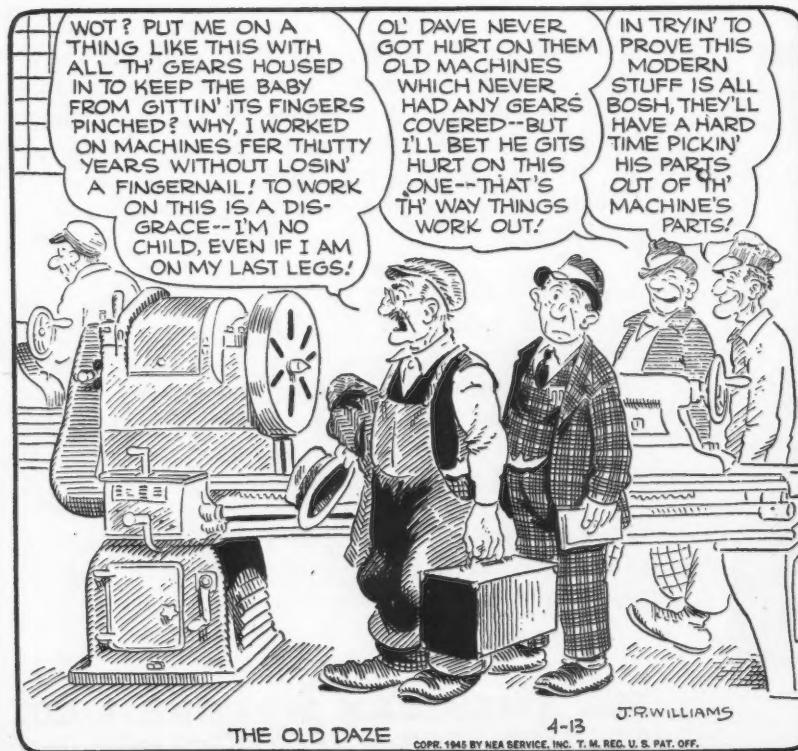
The handwriting on the wall is clear that the administration's attitude toward dropping war business is fearful—fearful that there will be extended unemployment on the one hand, and fearful that the rush to civilian industry jobs will hinder production of war goods to fight Japan on the other.

This fear may be translated into rattle-brained restrictions which will only deepen the seriousness of industrial unemployment after the end of the European War.

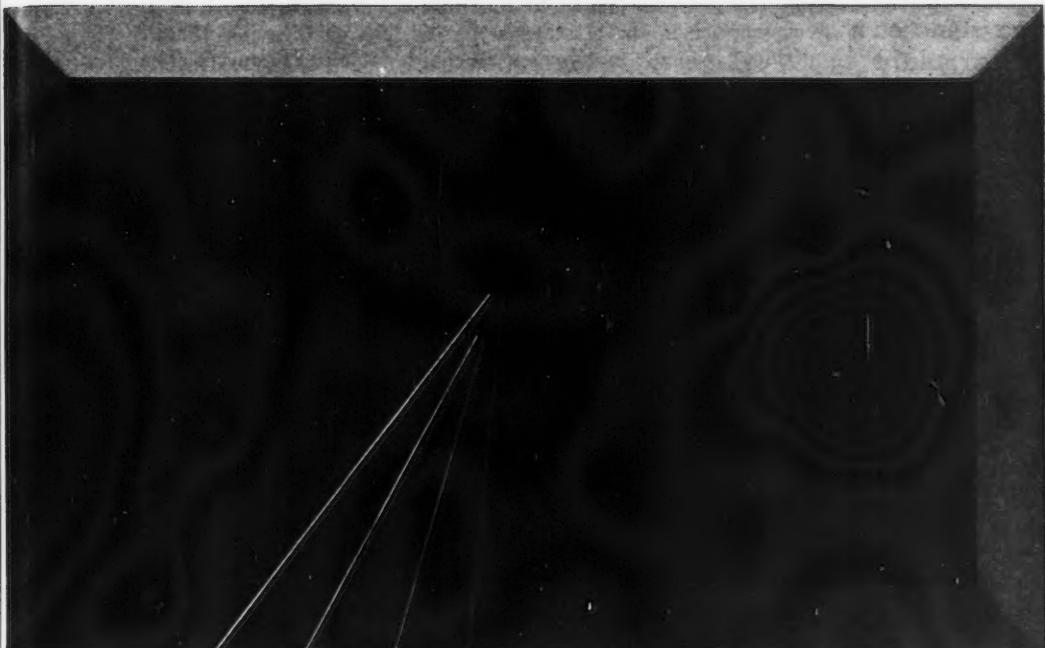
Naturally if a man is discharged, and he is not offered another war job fairly soon, he is bound to look for civilian employment. But the government has promised to provide jobs where industry is unable to, and this promise should be relied upon, if it will result in a speedier and more successful reconversion. Everyone may not agree with this philosophy as a long range permanent government practice, but if reliance upon it will prevent the putting of unnecessary restrictions upon industry, then it should be adopted long enough to give a flying start to industrial recovery.

THE BULL OF THE WOODS

BY J. R. WILLIAMS



HE Doesn't know WHERE HE IS!



PICTURE OF A
MACHINE OPERATOR
"WORKING IN
THE DARK"

He doesn't know where he is—and he doesn't care. He was given just a job to do. "Run so many pieces" the boss said—"We'll check 'em later!" So the operator went to work—in the dark—without knowing "where he was." What if something did get out of adjustment or the tools wear faster than they were supposed to. He should worry—the bad parts wouldn't show up till the job was done.

But suppose the boss had said, "Joe, run so many of this. It's got to be a good job—hold it close. And here's a gage to show you where you are. Check every piece. If anything gets out'a line, call me—*don't run scrap!*"

Here was a real job—a responsibility. It was up to Joe to make GOOD parts—and not make any scrap. The job was tough—he had to hold it close. But Joe did it—and he was proud of it. He knew "where he was" because he checked each part right at the machine with his Sheffield indicating gage. The gage told him whether the machine was going out of adjustment—when the tools were getting dull—and if he was doing anything wrong.

If your jobs are tough—and scrap is piling up—because your operators are "working in the dark", CHEK WITH SHEFFIELD.

Write for Engineering Data or a demonstration in your plant of Sheffield Visual Gages • Precisionaires • Airsnaps • Electrigages • Dial Indicator Snaps and Thread Checking Instruments. "THERE'S A SHEFFIELD INSTRUMENT FOR EVERY GAGING APPLICATION."

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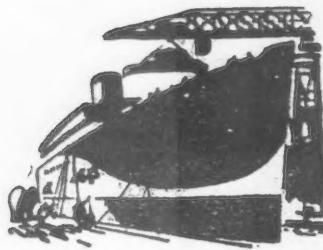
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West Coast . . .

OSGOOD MURDOCK

- Seek tangibles in first round of the western steel fight . . . No political favors, no subsidies wanted . . . War plant operation by private enterprise with full employment for primary objective.



SAN FRANCISCO—The iron and steel section of the local Chamber of Commerce is the first subdivision of the recently formed Western States Council to formulate and release its recommendations for a plan of action aimed at retention of an integrated western steel industry. Approved by the Chamber's board of directors, the committee has aimed at drawing up a down-to-earth, feet-on-the-ground, five-point program covering employment, resources, market, prices and freight rates, and disposal of government plants.

Chronologically third, but first in interest, is the Chamber's estimate of markets. Based on a study of the iron and steel division of the Kaiser Co., Inc., the western postwar steel consumption is listed at 2,906,500 tons in the following categories in tons: Mill products, 443,300 with hot mill products set at 215,200 and cold at 228,100; tin plate, 438,900; plates 224,200; structural shapes and rails 427,500; bars 465,000; wire products and nails 300,000; tubular products 490,000 and other miscellaneous items 111,600. Kaiser Co. estimates the increased consumption at around 33 per cent over prewar years, with increases running anywhere from 10 per cent for tin plate to 150 per cent for cold finished bars and sheets.

These figures represent estimated totals for the eleven western states. For overall comparison purposes 10

per cent may be added to the total consumption in the 11 states with individual changes in tonnage varying widely.

The report also publishes Dr. J. R. Mahoney's figures on estimated finished production capacity, for the 11 western states which totals 3,163,608 tons. Indicative of the Chamber's attitude on the subject, committee members refer to the two figures as "an interesting statistical coincidence." Members admit privately that public comparisons and analyses of the two sets of figures make good reading but must eventually be broken down into specific comparisons, product by product and ton by ton. Sufficient discussion in general terms and hundreds of thousands of tons have taken place, they say. Now the time has come to put theory to the test. Their studies on the subject will be directed to this end, regardless of opposing interests represented on the committee.

Next in importance in the report is the discussion of freight rates. "While Pacific Coast ports," the Chamber says, "have been designated as 'basing points,' the base prices at these points have reflected base prices applicable at eastern points, plus arbitrary sums approximating rail or intercoastal steamship freight charges," referring to the government's present practice during the ship shortage of paying a price figured against eastern coast and overland freight rates for finished plates. "Proximity of the western fabricator to a western rolling mill has not been of particular significance so far as the cost of steel to him has been concerned . . . Transportation costs for inbound materials and outbound finished products constitute a major expense within the iron and steel industry. It is justifiable, then, to encourage an industry that can stimulate related manufacturers by offering prompt delivery without the existing overhead of transcontinental freight charges. Eastern steel industry will tend to be discouraged from reducing base prices at Pacific ports because of the comparatively high freight absorptions, even from Sparrows Point."

In other words, if the West starts to produce at prices competitive with Sparrows Point, or if western competition creates price reductions, all other inland producers will have to

continue to absorb an eastern freight charge, leaving Bethlehem in the dubiously happy position of the major competitor and the rest of the companies up against the problem of whether volume is more to be valued than price on marginal tonnage.

MEMBERSHIP in the steel section includes producers and fabricators, both eastern and western. Opinions on any given subject will range from one extreme to the other, but the middling attitude of members seems to reflect an agreement with the historical rather than the hysterical method of determining freight rates. Western industrialists recognize the impossibility of setting rates on a flat ton-mile basis in sparsely settled territory. They would rather have a solvent road than no railroad at all. It is unanimously recognized that the western canning and lumber industries would curl up and die if the rate were to be determined on a mileage basis. Members take a realistic view of the entire situation and expect no special regional favors for the West.

Similarly, on the subject of plant disposal, the report recognizes the federal money in Geneva and Fontana, and predicts that under existing legislation Congress will undoubtedly be sensitive to the will of the public in regard to the disposition of these plants.

The objective for this point is "to influence national policies to expedite the disposal of a government-owned or financed war plant for operation as a private enterprise, on an economically sound basis that will be fair and equitable, and redound to the economic benefit of the western states and in turn to the nation."

When asked to elaborate on this point, committee members agreed that the West wants no subsidies. However, a reduction in the sale price of a war plant is not regarded as a subsidy, which appears to bring the subject back to its starting point.

Outcome of the recent conversations between officials of DPC and interested western businessmen was that two main points should constitute the guiding policy on this subject—first, to try to return the plants to a full employment policy as rapidly as possible; second, to get the highest pos-

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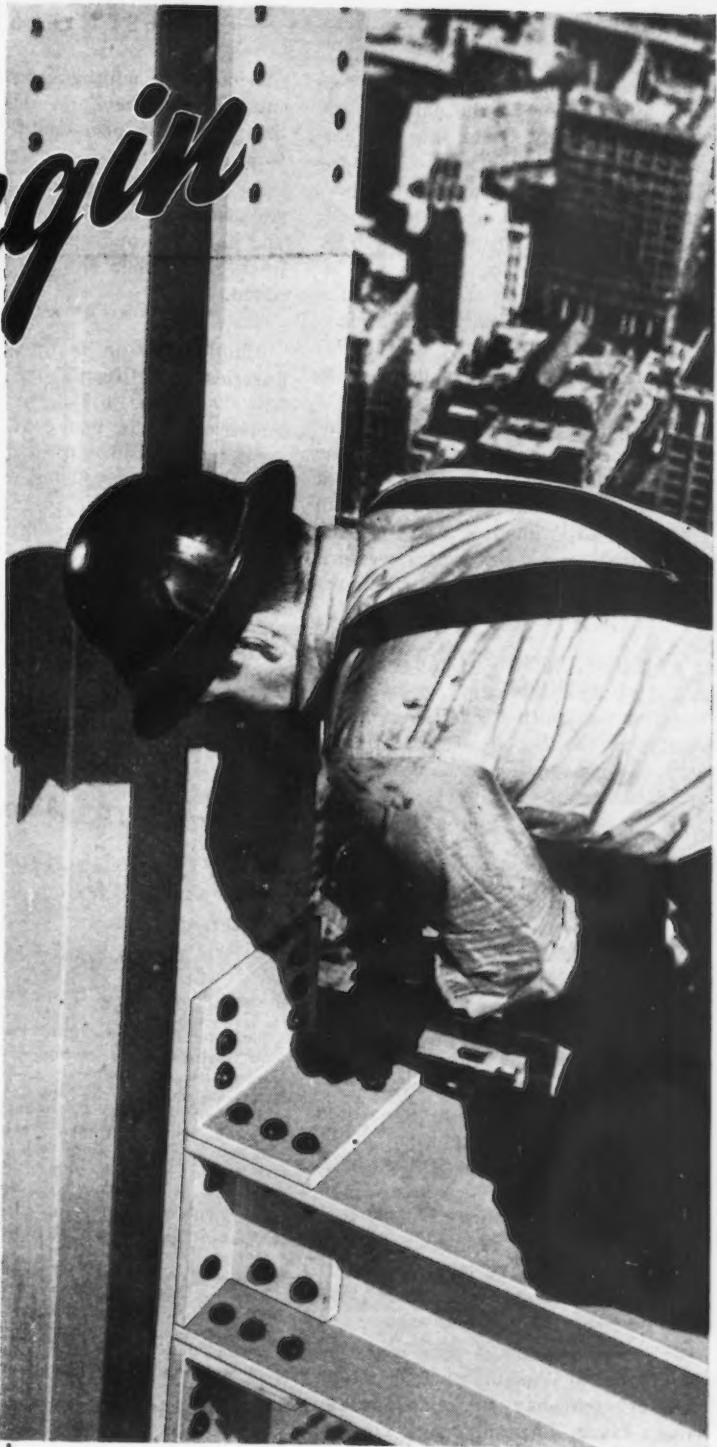
No Margin ...FOR ERROR

Five hundred feet below lies an acre of asphalt—and oblivion! No margin for error here...no room for a single false move.

It's the same way in building the power links which form the all-important connection between driving and driven units. No margin for error here, either!

For more than 26 years, Twin Disc has recognized this importance of *being sure*... being sure that Twin Disc Clutches and Hydraulic Drives are *right*...right in design—in construction—in application. Year after year this emphasis on "making it right" has paid dividends in smoother, more efficient transmission and control of power...has been reflected in the growing list of powered equipment and machinery manufacturers who standardize on Twin Disc products.

Whether solution to your particular problem lies in friction clutches or hydraulic drives, Twin Disc engineers are ready with an unbiased recommendation—because Twin Disc builds both. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).



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WEST COAST

sible recovery for the government from the point of view of the national and regional economy. Quick sale at whatever price necessary to achieve the first objective appeared to be the most satisfactory method of achieving the second aim, which still doesn't get too far from the starting point.

Under the heading of resources, the committee has gone on record as favoring the current activity of the Bureau of Mines in its experiments with the electric furnace processes for the production of ferroalloys. The committee doesn't expect to supplant the blast furnace method in the iron and steel industry, but it does advocate continued experimental work on the alloys, with an eye toward the western chrome, manganese and other mineral deposits.

RESULTS of the Chamber's activity on the employment front received recognition with the area's removal from the No. 1 critical category. In conjunction with other civic and labor groups an appeal was made to Washington to remove the higher designation in view of the increasing shipyard layoffs. While it is broadly believed that this change will stimulate the placement of new contracts in the area, actually it would require a reduction to a No. 3 or 4 category before procurement agencies could place contracts without review from the APUC. This body is frankly skeptical as to the bay region's ability to execute any other contracts than those which are now being placed. They maintain that it is a matter of skills, both manufacturing and labor. Officials of the war agencies believe that an accruing benefit is largely psychological. It has made local employers feel that now they are getting somewhere on the road to conversion.

Sole repercussion to date is a similar appeal to Washington from small, thriving, transbay Berkeley for the same favor. Anticipating possible similar appeals from Los Angeles, government officials state that such a change in the South is not justifiable. Shipyard layoffs in that area are being readily absorbed in the Navy's huge Inyo-Kern project and another secret project. Los Angeles is not encountering San Francisco's difficulty in the employment switchover, as construction wage rates are comparable to shipyard rates for semi and unskilled labor. In the largest recent Los Angeles shipyard layoff, 80 per cent immediate re-employment was achieved under the increasingly popular Portland plan. The 20 per cent lag is

attributed to willingness of the feminine contingency and the older age group to retire permanently from war work.

In view of continuing prime and sub-contracts in the Los Angeles area and shifting conditions in the Northwest, no further changes are anticipated.

* * *

Employment in manufacturing industries in California has risen from 320,000 in 1940 to 750,000 in 1945, an increase of 134 per cent. Employment in the iron and steel industries has risen from 30,600 to 50,900 over the same period, an increase of 66.2 per cent, although certain divisions of the industry show an increase as high as 290 per cent.

Principal objective of the committee under the employment heading is to determine specifically what industries are actually desirable as addi-

tions to the western economy. To date no such studies have been made and while it is generally agreed that new industries are desirable, little attention has been paid to whether they can operate profitably or not.

Business leaders say that public discussion of all these factors is a healthy thing, even though such discussion is relatively uninformed, but now the time has come to cut out the loose talk and get down to cases. They point out that comparative figures, for instance, show a huge margin of automobile production over consumption, but that it is obviously impossible to start manufacturing automobiles in the West. The same thing applies, they contend, to other industries. They plan to conduct studies which will isolate all the related factors and give some clear indication of what practical plans they can lay.

* * *

In conjunction with the Chamber's figures on employment, the 12th District Federal Reserve Bank reports that West Coast manufacturers plan to employ 780,000 people postwar. This amounts to a 40 per cent increase over 1939 employment, but a 50 per cent reduction from peak employment in 1943. The bank report says that no major shipyard or aircraft plant is to be converted to large-scale manufacturing. Plants accounting for 42 percent of total value of production are to be closed down, and plants accounting for 54 per cent will return to prewar production, and four per cent will make new peacetime products. Exclusive of shipbuilding, the same relative figures are three percent to be closed down, 91 per cent prewar production, and six per cent new products.

Capital outlay is estimated at \$430,000,000 exclusive of Fontana, Geneva, and light metals plants in the Pacific Northwest. More than \$200,000,000 will be apportioned to plant and equipment which amounts to almost twice the 1939 outlay. New plant construction will account for about \$70,000,000. Structural additions will take \$85,000,000, retooling \$60,000,000 and \$155,000,000 for the accumulation of working inventories.

Despite the admitted divergence of interests on the entire subject, the committee is the first one known to have reduced the individual problems to a form where they can be separately attacked and transformed from the realm of wishful thinking to terms of what is industrially possible.

Check these Features of

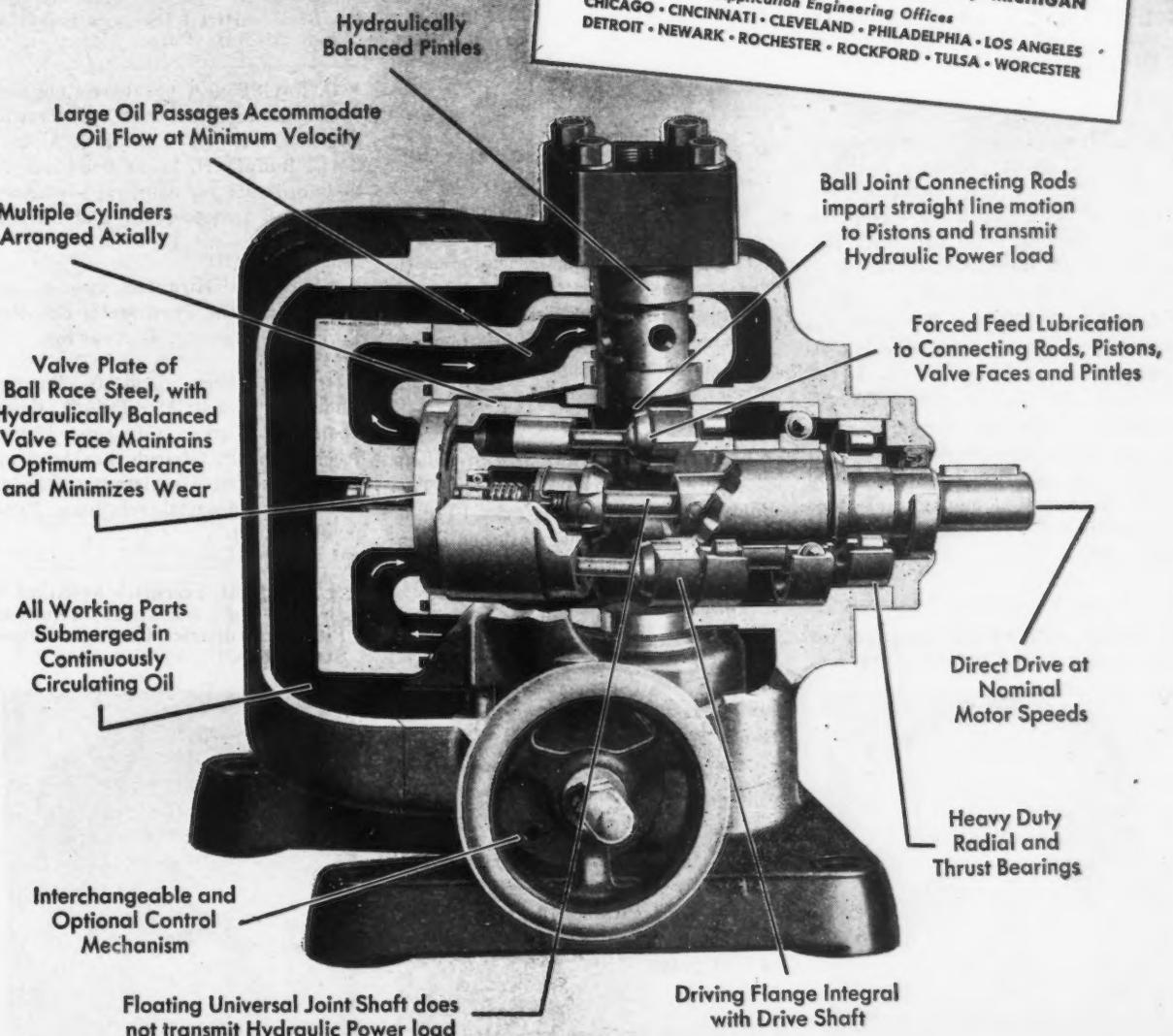
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PERSONALS



S. L. MYERS, vice-president and general sales manager, LaPlant-Choate Mfg. Co., Inc.

• S. L. Myers, formerly vice-president in charge of export sales for LaPlant-Choate Mfg. Co., Inc., Cedar Rapids, Iowa, has been appointed vice-president and general sales manager, succeeding H. H. Buchanan, resigned.

• Douglas W. Vernon has been appointed general manager of sales, A. Leschen & Sons Rope Co., St. Louis.

• Charles Schramm, formerly manager of sales, Secondary Products Division, Carnegie-Illinois Steel Corp., has been appointed manager of sales of the Tin Mill Products Corp., Pittsburgh, Pa.

CHARLES SCHRAMM, manager of sales, Tin Mill Products Corp.



• J. D. Zaiser has been elected executive vice-president and general manager of Ampco Metals, Inc., Milwaukee, to succeed C. J. Zaiser who has resigned but will remain as president. Reinhold Kunz has been elected first vice-president and George Dreher, second vice-president.

• John M. Martin, for the past year assistant to the general manager of the Kenmore plant, Airplane Division, Curtiss-Wright Corp., Buffalo, N. Y., has been named manager of Division Subcontracting. Mr. Martin succeeds W. R. Baldwin, who has resigned due to ill health. L. W. Botts has been appointed to succeed Mr. Martin in the Kenmore plant post.

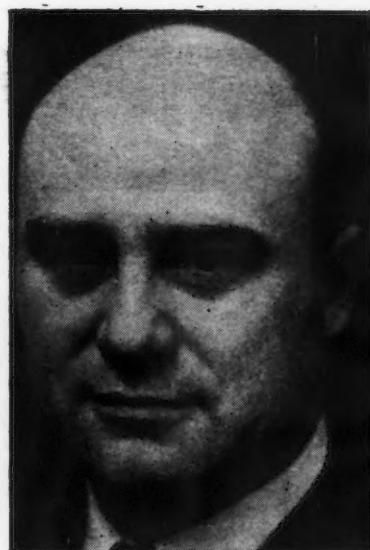
• N. K. Daerr has been appointed sales manager of the Fort Pitt Steel Casting Co., McKeesport, Pa., a division of the H. K. Porter Co., Inc. Mr. Daerr has been associated with the company since 1923. Prior to his appointment in 1940 as sales engineer in charge of the eastern territory he was manager of the Manufacturing Division.

• Frederick G. Schranz, vice-president of Baldwin Southwark Division, The Baldwin Locomotive Works, Philadelphia, since 1941, has resigned as an officer of the company but will remain in a consulting capacity.

• Robert E. Briggs has been appointed shop engineer; Ivan B. Wagner, senior assistant shop engineer, and Henry Wagner, Jr., assistant shop engineer of the Lima Locomotive Works, Inc., Lima, Ohio.

• R. S. Quinn, general superintendent of Mingo Works, Carnegie-Illinois Steel Corp., Pittsburgh, has retired after 56 years of continuous service at that plant.

• J. C. Lanz has been appointed manager of accounting for the Transportation and Generator Division, Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., and E. P. Gooch has been made staff assistant in the Headquarters Industrial Accounts Division of the Pittsburgh office.



D. ROY SHOULTS, vice-president, Bell Aircraft Corp.

• D. Roy Shoultz, previously engineer of the General Electric Co.'s Aviation Division, has joined the Bell Aircraft Corp., Buffalo, N. Y., as vice-president to co-ordinate the company's military, industrial, commercial and civilian sales activities.

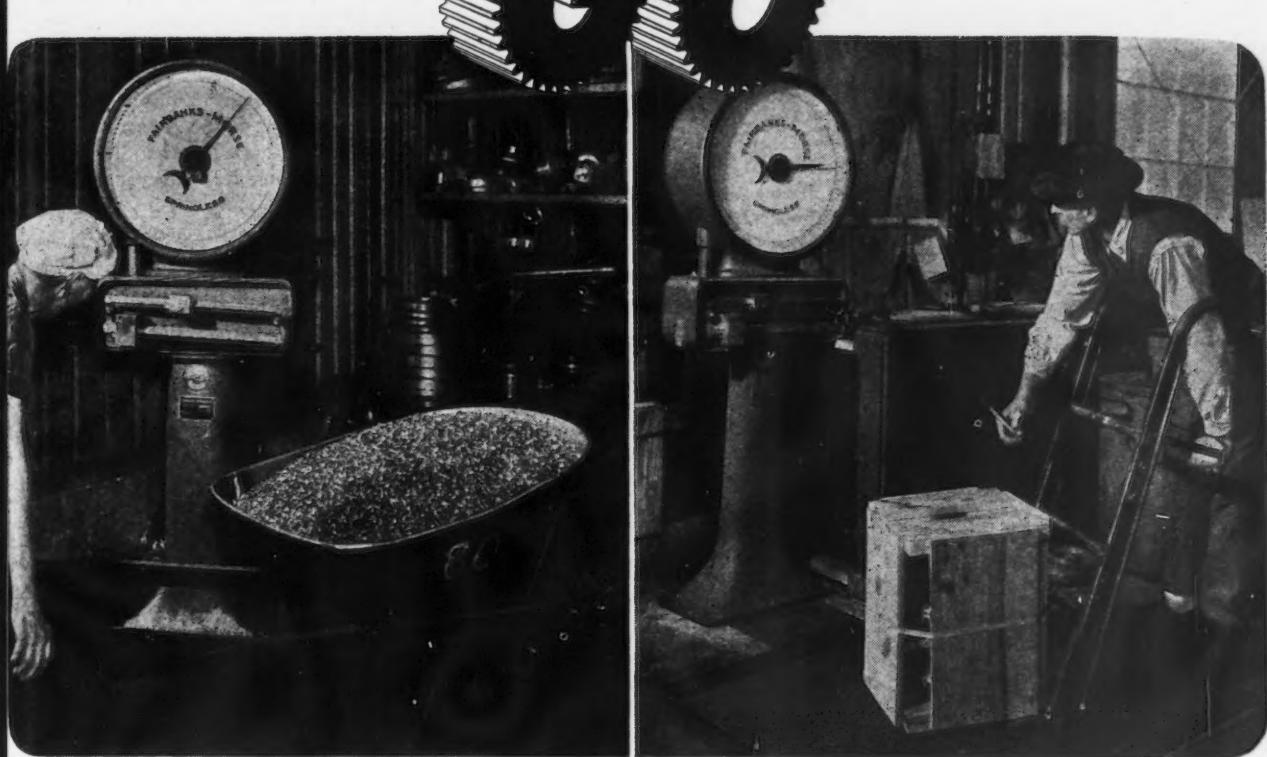
• Charles A. Hird has been elected treasurer of the Penn Metal Co., New York, to succeed J. G. Crowley.

• O. L. Weber, formerly superintendent of industrial relations, Edgar Thomson Works, Carnegie-Illinois Steel Corp., Pittsburgh, has been appointed executive assistant to the director of industrial relations, Pittsburgh district.

O. L. WEBER, executive assistant to director of industrial relations, Pittsburgh district, Carnegie-Illinois Steel Corp.



SCALES HELP PUT THE GO IN GEARS



BIG gears and little gears—hypoid and helical—spur and spiral—all made to order at Fairfield Manufacturing Company. And Fairbanks-Morse self-contained Dial Scales help do the job. In salvaging 50 to 60 tons of machine scrap a week, and in the shipping department, records must be made and kept swiftly and accurately.

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remembering*

PERSONALS



W. W. WILSON, vice-president, Roth Mfg. Co.

• W. W. Wilson, formerly general manager, Roth Mfg. Co., Chicago, has been appointed vice-president. Mr. Wilson joined the company in 1914 as assistant to the president, becoming general superintendent in 1930 and general manager about five years ago.

• J. R. Guth has been appointed director of purchases for the Tyson Bearing Corp., Massillon, Ohio. Mr. Guth was assistant sales manager in the Tyson Aircraft Division prior to his recent appointment.

• Arthur R. Shevlin has been named New England sales and service representative for Eclipse Counterbore Co., Detroit.

• Claire L. Barnes, founder and for many years president of the Houdaille-Hershey Corp., has been elected chairman of the board of directors, Bendix Helicopter, Inc., New York, succeeding the late Vincent Bendix.

• A. W. Taylor has been appointed purchasing agent for the Crucible Steel Co. of America, New York.

• J. J. Roessle has joined the Hyatt Bearings Division of General Motors Corp., Detroit, as a sales engineer at the Pittsburgh divisional sales office.

• S. B. Blakely has been appointed manager of brand sales, National Battery Co., St. Paul, succeeding G. W. Mixon, resigned.

• John M. Richards, for the past 11 years manager of the operating department of the Buffalo, N. Y., plant, Bliss & Laughlin, Inc., has been appointed manager of operations of the company's Harvey, Ill., plant.

• William C. Dunn, president of Ohio Crankshaft Co., has been elected a director of the Ohio Seamless Tube Co., Shelby, Ohio, succeeding the late Walter W. Van Horn. E. W. McNeill, secretary and treasurer; Aaron Waines, Jr., manager of sales and Clayton Mayer, works manager, have been elected vice-presidents in addition to their previous duties.

• Fayette Leister has been named engineering manager, The Fafnir Bearing Co., New Britain, Conn. Mr. Leister joined Fafnir in 1921 as a sales engineer. For the past ten years he has been manager of the Detroit territory.

• Ray W. Cragin, for the past four years manager of the Washington, D. C., zone, has been named director of the New York sales region, Packard Motor Car Co., Detroit.

• Harry I. Lutz has been elected to the board of directors, Edgcomb Steel Co., Philadelphia. Carl S. Vogel has been named manager of sales.

• Donald C. Potts has been appointed assistant to the president, Pittsburgh Steamship Co., a U. S. Steel Corp. subsidiary.

• Henry F. Harrison has been named master mechanic of the Michigan Tool Co., Detroit.

• Ward Keener has been appointed assistant to the president of The B. F. Goodrich Co., Akron, Ohio. Dean E. Carson succeeds Mr. Keener as director of business research.

• Milton W. Allen has been named sales representative in Colorado, Montana, New Mexico, Utah and Wyoming for Columbus McKinnon Chain Corp., Tonawanda, N. Y.

• Dr. W. B. Pings has joined the staff of Arthur D. Little, Inc., Cambridge, Mass.

• Charles L. Beard has been named vice-president and treasurer of the Bell Aircraft Corp., Buffalo, N. Y.; Leston P. Faneuf has been promoted to secretary of the company and chief of the corporate staff and Harvey Gaylord has been appointed assistant treasurer.

• Joseph S. Sampson has been appointed assistant to the general traffic manager, Wickwire Spencer Steel Co., New York; Donald J. Carey has been appointed traffic manager in charge of the New England Division.

• Lt. Com. David F. Robinson, recently granted inactive status by the Navy, has joined the Harrington-Wilson-Brown Co., New York.

• R. F. O'Brien has joined the technical staff of the Automatic Temperature Control Co., Inc., Philadelphia, as instrument engineer to handle special sales and engineering applications.

OBITUARY...

• Professor Alfred V. de Forest, a member of the faculty of the department of mechanical engineering at Massachusetts Institute of Technology and president of the Magnaflux Corp., Chicago, of which he was the founder, died in Marlboro, N. H., April 5. He was 56 years old. Professor de Forest was widely known in the metallurgical world for his development of the Magnaflux Test, a magnetic method for discovering defects in metals.

• Charles E. Sweet, president and founder of the Superior Machine & Engineering Co., Detroit, died March 11.

• William J. Magavern, 79, general counsel and secretary of the Strong Steel Foundry, Buffalo, N. Y., died March 26.

• Joseph F. Huebsch, Sr., president of the Huebsch Mfg. Co., Milwaukee, died March 26 at the age of 76.

• Walter B. Smith, 66, chairman of the board of directors, Illinois Tool Works, Chicago and Elgin, Ill., died suddenly April 2.

• Herbert W. Forster, 47, advertising manager of Western Electric Co., New York, died suddenly March 30.

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Roanoke	Sanford, N. C.	St. Louis	Los Angeles	San Francisco	Seattle	Montreal	

Dear Editor:

JET PROPULSION ALLOY

Sir:

We would like a reprint or tear sheets of an article you may have published recently which dealt with the metallurgy of jet propulsion materials.

R. K. WARREN,
Metallurgist

Crucible Steel Co. of America,
Syracuse, N. Y.

• Mailing tear sheets of the article, "Factors in the Development & Selection of High Temperature Alloys for Dynamic Loading," from The Iron Age, June 1, 1944.—Ed.

GALVANIZED SHEETS

Sir:

We would like to know how many tons of galvanized steel sheets were manufactured in the U. S. in 1938 and will appreciate it if you will advise us.

C. C. EDELEN,
Development Department
Surface Combustion,
Toledo, Ohio

• The American Iron & Steel Institute reports production of the following net tonnage in 1938: Flat, 1,176,709; formed, 59,398.—Ed.

SCRAP PRICES

Sir:

In regard to your published scrap prices for Buffalo we have not been able to get prices from dealers and brokers equaling those quoted. I would be interested in knowing the basis for your scrap prices in order to understand why this difference should exist.

G. J. BUTLER,
Purchasing Agent
Houde Engineering Division,
Houde-Hershey Corp., Buffalo 11

• As indicated in the heading, these are prices delivered to consumers at Buffalo, the consumer being steel mill or foundry. When the dealer buys scrap from you, it is necessary for him to arrange for its preparation, classification and transportation. These cost factors vary appreciably between scrap producers, resulting in some variation in prices paid by dealers.—Ed.

WAREHOUSE STEELS

Sir:

Is there a guide published as to types of steels carried by specified warehouses? We are eager to determine logical sources for alloys, high carbons, low carbons, strips, sheets and bars. It would be helpful to companies that have to depend upon warehouse stocks for small quantities to have some kind of geographical list of steel warehouses and the types of steel they handle.

M. F. TANZER,
Purchasing Agent
Gale Products,
Galesburg, Ill.

• We would suggest that you write the American Steel Warehouse Assoc., 442 Terminal Tower Bldg., Cleveland, who may be able to provide you with a geographical listing of warehouses comprising the association, from whom can be developed the specific information desired. It is possible that some information on the range of products carried by specific warehouses can be obtained from the association itself.—Ed.

MILLIMETER MIXUP

Sir:

In arguing that Americans realize metric dimensions can only be divided by 2 or 5, A. W. Miller in the Dec. 7 Dear Editor forgets the factor 10 which is the basis of our decimal system. And if the metric system is simple and logical, it is not because of easy subdivision or because the meter is a certain fraction of a meridian, but solely because it is based on decimal units as is our numeration system.

Of course, a duodecimal system (basis 12) would be more convenient from a dividing standpoint. But a long time ago we agreed to adopt the ten Arabic digits in our numeration instead of the more advantageous 12. Certainly nature is responsible as humans have only ten fingers (digitus, finger), and it would be hard now to change. The trouble with the English procedure is that it mixes a decimal numeration system and a complex system of weights and measures with bases of 12, 16 or 20.

As for the observation to the effect that the French still buy their vegetables by the "livre," may I add that Mr. Miller has not often bought spinach at the Paris "fruitier du coin," otherwise he would know that the present "livre" is just a convenient name for a half-kilogramme and has nothing to do with the English pound. His remark about the failure of the ten-day week has nothing to do with the rationality of the metric system. The Lord's Day is the last and seventh day of the week; most French are Catholics and did not want to follow, for religious reasons, the poetic and partly decimal—ten days a week, but twelve months a year—system of atheistic Fabre d'Eglantine.

PIERRE GUILLAUMERON
L'Air Liquide Society,
1111 Beaver Hall Hill, Montreal

ELECTROSTATIC PAINTING

Sir:

The British journal Sheet Metal Industries, published an article "Electrostatic Paint Spraying and Detearing," by H. Forsberg with the permission of THE IRON AGE. At present there are no manufacturers of such equipment here. Could you have man-

ufacturers of equipment for the process get in touch with us?

R. SMILLIE
Rolls-Royce Ltd.,
Hillington, Glasgow, S. W. 2, Scotland

• We have passed on your inquiry to the Arthur J. Ransburg Co. of Indianapolis, Ind., who are the originators of this process.—Ed.

IRON POWDER PARTS

Sir:

I should like to make stake pockets for motor trucks. Is the use of powdered iron very expensive, and is it adapted to being electric welded to carbon steel? Could stake pockets be cast strong enough and accurately enough to serve a purpose similar to that of steel castings? Can you also give me some idea of mold costs, as compared to foundry or die casting molds?

CLEM ERNST

Sidney, Ohio

• It seems to us that the cheapest and most satisfactory way of making a truck body stake pocket would be to form it out of a stamping, ribbed to give added strength and rigidity.

Production of powdered iron parts is still in the experimental stage and confined to small, intricate parts where the extra cost of material and dies is offset by elimination of machining operations. We quote powdered iron all the way from 4c. a lb. for crushed iron containing 90 per cent Fe up to 90c. a lb. for carbonyl iron of 98 to 99.8 per cent Fe. The mold costs would compare with die casting mold costs which are relatively high and are only warranted where the production runs are reasonably large. At the present stage in development, powder metallurgy products are relatively weak. It is our opinion that the material would be insufficiently strong for a stake pocket and probably the most expensive way of making such an item.—Ed.

INDUCTION HEATING

Sir:

We would like to have two copies of the article on "Induction Heating" by Frank T. Chesnut, which appears in the March 22, 1945 issue.

C. W. HEPPENSTALL, JR.,
Vice-President in Charge of Operations
Heppenstall Co.,
Pittsburgh 1

• Tear sheets have been mailed.—Ed.

SAFE DEGREASING

Sir:

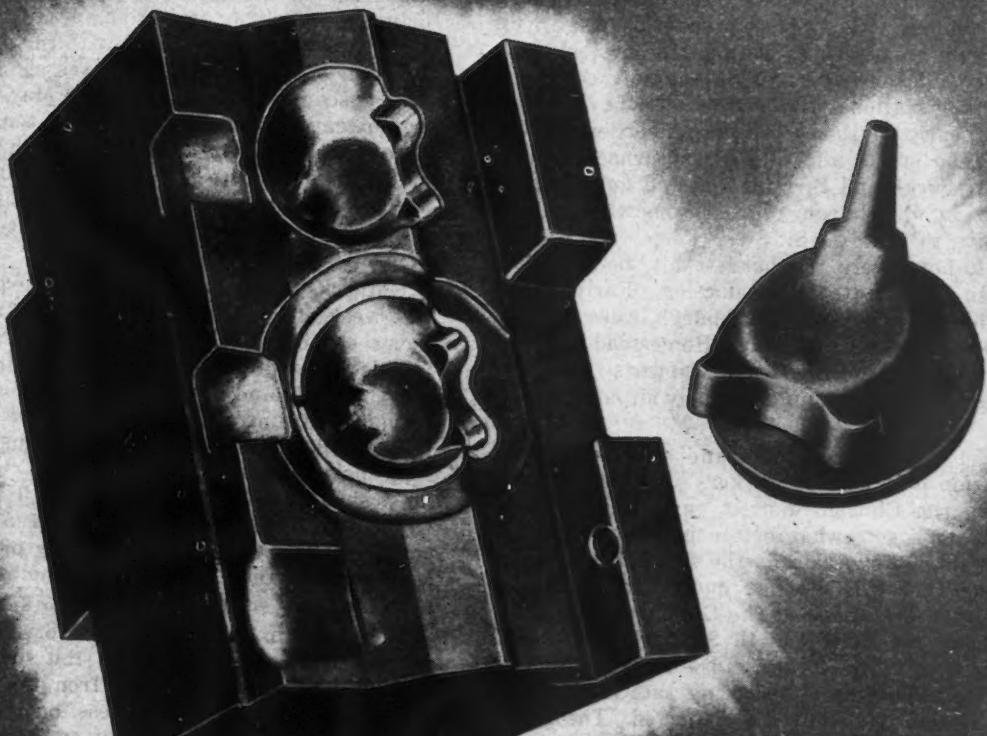
We are installing a Detrox Degreaser and we found your article in the March 1 issue entitled "Safe Operation of Solvent Degreasers" by L. P. Litchfield very interesting. We would appreciate having a few copies of this article to pass out for study to those in our employ who will come in contact with the operation of the degreaser.

H. L. CHAPIN, JR.,
President
"All-Purpose" Metal Equipment Corp.,
Rochester, N. Y.

• Tear sheet mailed.—Ed.

T & W FORGINGS

Usually Cost Less at the Point of Assembly



Time is an element of cost, and the time it takes to machine and finish a forging is an element of its cost at the point of assembly.

Check your forging costs at the point of assembly with a T & W Forging Engineer.

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This Industrial Week . . .

- **Unofficial Coal Strike Cuts Steel Output**
- **Order Volume Dips Slightly Due to Conservatism**
- **Ammunition Program Cutbacks Are Awaited by Industry**

THE unofficial coal strike affecting particularly those mines vital to steel production was in the spotlight this week as the figures on steel losses rolled in. While developments in the soft coal mine operators' negotiations with John L. Lewis indicated once more, early in the week, that a settlement was imminent, the strike affecting blast furnace production in Pittsburgh and Birmingham and finished steel production in Pittsburgh relaxed somewhat. Pittsburgh units of the U. S. Steel Corp., particularly Carnegie-Illinois, were the hardest hit, being forced to cut both iron and steel production. Early in the week 12 blast furnaces in Pittsburgh were banked, and 37 open hearths at Clairton, Homestead and Duquesne were shut down. Coal shipments from the south were said to be easing the supply situation somewhat.

The effect of mine stoppages and slowdowns since the expiration of the mine workers' contract had not yet reached the Chicago district early in the week, due mainly to a somewhat better inventory position in those plants. Reduction of the Chicago operating rate 2.5 per cent this week is due to shutdowns of two big open hearths, one at the Gary and one at the South Chicago works of the U. S. Steel Corp.; coal was not a factor. If the mine picture does not improve immediately, however, the operating rate in this district will, of course, be adversely affected. The Pittsburgh rate dropped to 85 per cent.

THE volume of steel orders is down very slightly this week, although not sufficiently to establish any definite trend. Some speculation is being heard that major steel consumers are trying to thin down their inventories as they did last summer, in anticipation of cutbacks considered imminent.

District offices of steel producers report that there is a more hesitant attitude on the part of buyers to place steel orders, and plate mills are somewhat concerned over the order picture for the coming months. It is felt by some that unless substantial orders are forthcoming soon, operating rates will be adversely affected during the summer.

Word is now that the end of major hostilities in Europe will immediately bring cancellations of about 5 per cent of total war contracts, to expand to around 12 per cent during the next three months. There is some belief in the steel community, however, that long before the 12 per cent cutback comes to pass some manufacturers, knowing that their work is soon to be eliminated, will cancel to the mills before the services cancel to them. Their hope will be to ride along on inventories until they get their telegrams from Washington. Opinion as to the extent of such policy is mixed, and many steel users will doubtless withhold their cancellations until they are officially notified.

Cancellations this week are reported somewhat more

numerous in most districts, although they are still primarily involving small tonnages. The drop in Maritime plate demand combined with the effect of the cancellation of 72 naval combat vessels has resulted in open space in many plate mills in May and June. Current demands are for about 750,000 tons a month, compared with a peak of about one million tons per month. With Maritime directives cut to 80,000 tons for July and none for August there is the possibility that plate demand will fall off to the point that production will be curtailed.

Cutbacks in the ammunition program, touched off last week at Jones & Laughlin's Keystone works, are being continued this week. A meeting in Chicago Monday was designed to gather Ordnance and shell plant officials and map out a 10 per cent cutback on ammunition contracts. Following fast on the heels of the cancellation at J&L was a suspension of the contract held by Rust Engineering Co. to design a 105 mm. shell plant at Ensley, Ala. Higgins at New Orleans, is believed to have had a 105 mm. shell contract cancelled this week, while the prospects for the completion of the 105 mm. shell line at National Supply Co.'s plant at Washington, Pa., grew dimmer.

Upheavals in the construction of shell plants were not without reverberations in the shell steel production field. Colorado Fuel & Iron Co. is reported to be soliciting structural business, on the basis that its shell steel program will be cut and there will be open space in its rolling schedules for structural steel.

MARCH shipments of finished products as compared with February seem to have improved in somewhat better proportion than the lengths of the months; one major producer's gain was upwards of 20 per cent. In this particular case the result was to reduce carryover in marked proportions. In other instances, however, no reduction in carryover was effected, sheets continuing to be the biggest stumbling block in this direction. While much of the delivery program consisted of cleaning out stocks of finished products, nevertheless shipments were heavy.

Advices from Washington are that numerous new directives, many on sheets, are still to be placed and this will slow the reduction of carryovers this month. On the score of directives, there are noteworthy indications that those on shell steel will be cut down, although the space will immediately be taken up by demand for other products.

This week saw the U. S. Engineer's Corps award contracts for 170 hangars requiring 26,000 tons of steel, while another major award was from the Bureau of Yards and Docks of the Navy for about 9000 tons of pilings to be delivered late this summer. J. T. Ryerson & Sons was awarded a contract to build a new tire plant for Inland Rubber Co. at Ottawa, Ill., requiring 2700 tons of steel.

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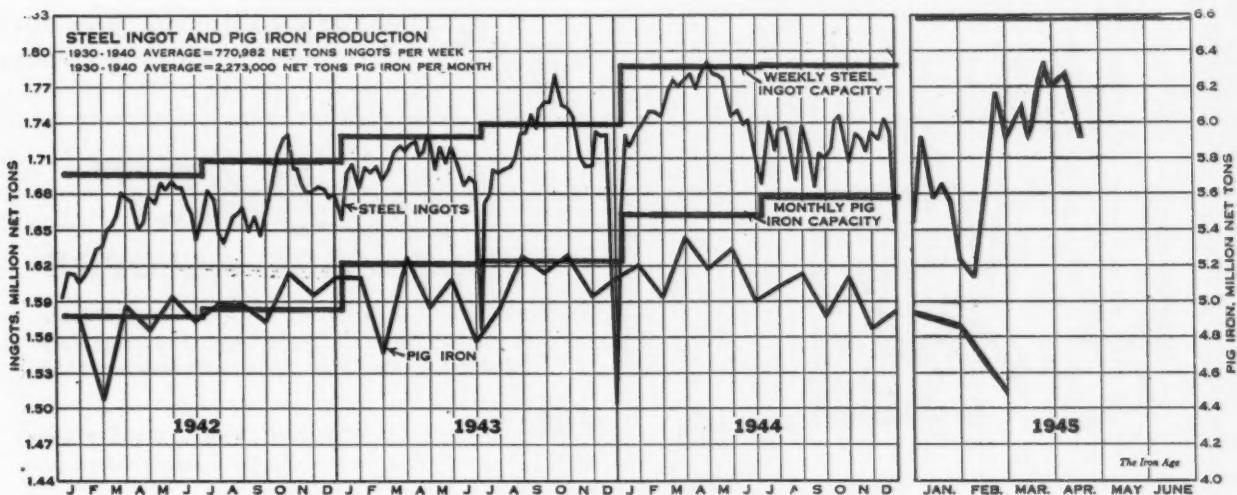
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INGOTS, MILLION NET TONS

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We
April 3.
April 10

- RAILROAD STEEL**—The Office of Defense Transportation is being given 34,000 tons of carbon steel for the construction of box cars which were returned by the Army from its second quarter allotment. Sufficient to produce 2,000 cars, the new supply of steel will fulfill the scheduled program of 20,000 box cars for the first nine months of the year. This new allotment makes up some of the 50 per cent lost by the ODT in the latest WPB allocation. Other than this program for box cars there has been no indication that additional equipment will be required immediately after VE-Day to transport supplies from eastern to western ports.
- COMMITTEE HEARINGS**—Maligned on many sides after its short period of testimony taken in Detroit recently, the Mead Committee is loath to return to the auto center for more digging into management-labor relationships there. They probably will not return unless the pressure from managements, eager to show that they are hobbled by union activity, proves too strong to withstand.
- PRODUCTION UP**—Steel production in March was the third highest of any month on record, according to the American Iron and Steel Institute, with an output of 7,724,756 net tons during the month. The March total was exceeded only by production in March 1944 when 7,820,226 tons were produced and by October 1943 when 7,814,117 tons were made. The high rate of production in March failed to offset the adverse effects of bad weather and manpower difficulties earlier this year, with the result that production in the first quarter fell more than 1,000,000 tons below that in the corresponding quarter of 1944. A total of 21,581,859 tons of steel was produced during the first three months of 1945, as against 22,595,283 tons in the first quarter a year ago. During March, steel plants operated at an average of 95.2 per cent of capacity, compared with 90.8 per cent in February, when 6,652,800 tons were produced, and with 98.5 per cent in March 1944. An average of 1,743,737 tons was produced per week during March, compared with 1,663,200 tons per week in February and 1,765,288 tons per week in March of last year.
- 1945 MODEL PASSENGER CARS**—Despite newspaper reports quoted widely in Detroit, there is no quota as of this week for the production of 250,000 cars in the last quarter of 1945. If Germany should collapse immediately, the story, baseless when published, would become true. Suggestions that a nameless car be built with the efforts of the principal manufacturers combined are rejected by the industry as unworkable.
- VETERAN SENIORITY**—Failure of a second series of conferences between the CIO Auto Workers Union and Chrysler Corp. to reach any agreement with regard to job seniority for veterans without previous service with the company points up a brewing conflict that must be resolved as soon as wholesale discharges begin. Chrysler proposed that equal work opportunities be given to veterans of this war and civilians now employed in Chrysler plants whose jobs started during the war. Chrysler stated that the union turned down this proposal. Union officials, however, said they were willing to give seniority to all new employees equivalent to their service time in the armed forces. The union's "standard clause" on this subject provides for such seniority, but does not offer any preferential treatment for veterans coming into a plant for the first time, thereby, in effect, placing them at the bottom of the seniority list until they obtain jobs.
- TRANSIT VEHICLES**—The Transportation Equipment Division of the War Production Board has announced a transit vehicle manufacturing program for 1946, approximately equal to the 1945 projections. Under this schedule for next year, street cars, trolley coaches, buses and bus bodies will be built for the Office of Defense Transportation, Army, Navy, Foreign Economic Administration and Canada. The 1946 allotments include 300 street cars, 348 trolley coaches, 9733 integral buses and 12,052 bus bodies. The comparable figures for 1945 are 639, 348, 9413 and 12,700. The approved program goal for 1945 is considerably higher in the bus category, sights being aimed at 12,050 integral units, as against the actual schedule of 9413. A goal of 400 trolley coaches is sought against a schedule of 348. Assignment of quotas of the vehicles will be made to individual manufacturers shortly.



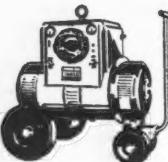
Steel Ingot Production by Districts and Per Cent of Capacity

Week of	Pittsburgh	Chicago	Youngstown	Philadelphia	Cleveland	Buffalo	Wheeling	South	Detroit	West	Ohio River	St. Louis	East	Aggregate
April 3.....	92.5	102.0	91.5	97.0	98.0	104.5	90.0	99.0	100.5	91.5	90.0	94.5	97.5	96.0
April 10.....	85.0	99.5	87.0	95.5	95.0	104.5	88.0	99.0	98.0	90.0	95.5	94.5	93.0	94.0



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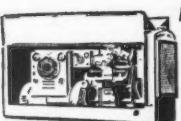
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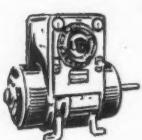
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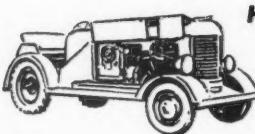
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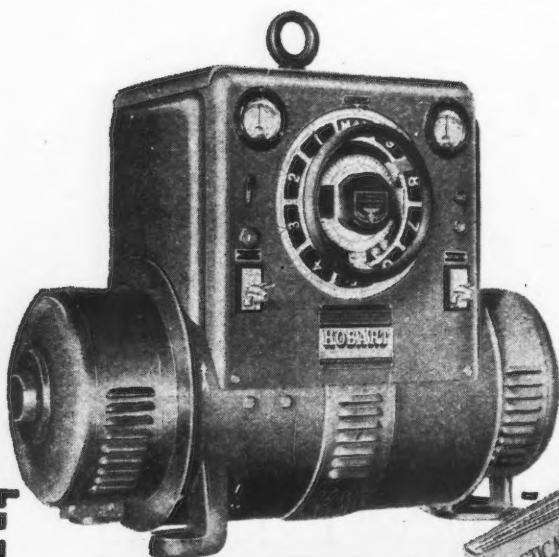


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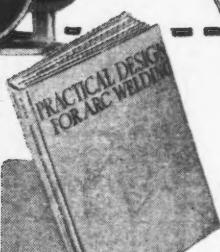


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Allen Announces Millions To Be Spent on CF&I Rehabilitation Job

Denver

• • • Tentative plans for extensive postwar rehabilitation and expansion of Colorado Fuel & Iron Corp. were discussed recently by new owners of the controlling stock interests, local newspapers report. Headed by Charles Allen, Jr., chairman of the board of both CF&I and Wickwire Spencer, the new directors inspected mill properties at Pueblo and the Sunrise Iron Mine in southeastern Wyoming.

"We have a number of plans for the postwar period," Mr. Allen declared. "It is too early to discuss them in detail, but I can assure you that millions of dollars will be spent on a rehabilitation program." Plans for development of new products are also being formulated. Controlling stock in the Colorado steel firm, which was acquired by Rockefeller interests shortly after the turn of the century, recently passed to Mr. Allen's New York investment banking group.

Through CF&I, the Allen syndicate later told Defense Plant Corp. it was interested in purchasing the mammoth Geneva Steel plant in Utah. Franklin Berwin, one of the new Colorado Fuel directors in the Allen group, confirmed the company's fears that Geneva would become a threat to CF&I if it fell into hostile hands. "If Colorado people are disturbed about it, I am afraid they will have to continue to be disturbed about it," he told reporters.

Walther Mathesius, president of Geneva Steel Co., U. S. Steel subsidiary now operating the Utah plant for the government, has contended that in responsible hands, it would be no threat to the Colorado firm. He has pointed out that it probably would be uneconomic for Geneva to roll rails as a peacetime product because of the dominant interest in Western rail business held by CF&I.

"I just hope Mathesius didn't lull the people of Colorado to sleep," Mr. Berwin was quoted as saying. Referring to interest shown by U. S. Steel, Kaiser, and CF&I in purchasing Geneva for postwar operations, Mr. Berwin is said to have declared, "That means there are three possible purchasers. They are Faith, Hope and Charity, and the greatest of these is Charity. We are for anything that is good for Colorado and that includes Geneva."

Charles G. Terry, named chairman of the finance committee by the Allen interests, advanced the theory that Rockefeller could have sold Colorado Fuel for more money to other purchasers, but that Rockefeller was primarily interested in seeing the corporation turned over to a management that would be concerned primarily with the welfare of Colorado and its

communities. It was understood in steel circles that Rockefeller wished to have his name divorced from the steel industry.

E. Perry Holder, president of Wickwire Spencer and also an Allen director of CF&I, told a Denver civic luncheon that, "We have come to Colorado to stay." Operating officials of the steel firm have been retained by the new owners including W. A. Maxwell, Jr., president, Fred Farrar, general counsel, and L. F. Quigg of Pueblo, vice-president in charge of operations.

Coal Strike Costs U. S. Steel 10,000 Tons Steel Production Per Day

Pittsburgh

• • • The coal strike in the western Pennsylvania area that started after a regular holiday on April 2 has cost



STATES CASE: John L. Lewis, president of the United Mine Workers, is addressing the WLB in Washington, where the UMW and soft coal mine operators were called to explain their refusal to continue working under extension of their existing contract.

approximately 30,000 tons in steel production. Hardest hit have been the steel and iron producing units of the U. S. Steel Corp., in the Pittsburgh and eastern Ohio districts. By Saturday noon, 12 blast furnaces had been banked and four more were scheduled for banking by Sunday night. The bessemer departments of Carnegie-Illinois Steel Corp. had lost 4000 tons a day starting on Wednesday midnight. On Friday afternoon, 37 open hearths of Carnegie-Illinois had been shut down.

On Thursday, only two of the 14 U. S. Steel mines in the area were in production, but on Tuesday seven more had returned to work. Coal production in the Uniontown district on Tuesday was estimated to be about 50 per cent of normal. Beehive coke production dropped to about 10 per cent in the middle of the week, but toward the close had risen perceptibly. However, the rise in coke production was not sufficient to put any of the blast furnaces back in operation.

Steel loss was reported on Saturday, at the rate of about 10,000 tons a day, mainly because of the fact that the Clairton Works' by-product ovens were only operating at about 48 per cent of capacity. This not only cut down the coke supply, but also the gas supply to many of the Corporation's units in this area.

There is an estimated 5½ days' supply of coal at Clairton and in transit to Clairton, which is being carefully hoarded to forestall a complete stoppage of production as long as possible. Meanwhile, some coal is being shipped in from the South, probably the Birmingham, Ala., district, to augment diminishing supplies here.

Tenth of December Ammunition Program Cut Off; Firms to Be Announced

Chicago

• • • Approximately a tenth of the \$2,000,000,000 ammunition program started up last December was lopped off this week from projected schedules by top Ordnance officials meeting here with War Production Board and War Manpower Commission heads.

Brig. Gen. R. E. Hardy, chief, Ammunition Branch, Office, Chief of Ordnance, said that the "course of the war" had fortunately made it possible to cut off around \$200,000,000 of the types of ammunition whose rapid consumption during the military setbacks late last year in Europe had transformed into critical items.

Operations in approximately 60 plants will be affected. Abandoned or most seriously curtailed schedules include new plants and facilities where production has not been started or where little progress on either construction or delivery has been made.

Most seriously cut back were schedules on 75 and 105 mm. high explosive shells, M-48, M-51 and M-54 fuses, and M-21 boosters. Slight reductions were ordered on 61 and 81 mm. mortar shells. Schedules on 57 and 90 mm. shells remain about unchanged.

Machine tools included in the 1945 schedules will be cancelled in some plants, while others will be transferred to other plants. A number, of course, will be allowed to continue in production.

All the cutbacks become effective at once. Names of individual plants involved will be released later, after they have been notified of the decisions at Chicago.

The indication was that the curtailments will advance the projected peak production date of next September a couple of months.

Alabama Miners Are Threatening Output As Furnaces Go Out

Birmingham

• • • Alabama's pig iron production was curtailed and a 99 per cent steel production rate was threatened Monday as a coal strike here went into its second week.

Idle were three of the state's 21 blast furnaces, although one of the three was to have been blown out for repairs between April 15 and May 1, regardless of the strike. Loss of iron due to the coal shortage was estimated at about 9,000 gross tons.

Because of the strike, the Tennessee Coal Iron and Railroad Co. moved up its plans to repair No. 5 blast furnace at Fairfield and blew out the furnace last week.

No steel ingot production has yet been lost by either the Tennessee Co. at its Ensley or Fairfield works or by Republic at Gadsden but unless

miners start back to work by Wednesday or Thursday, the Tennessee Company will be forced to reduce steel making to about 50 per cent.

Reports on the number of Alabama miners out on strike varied widely. United Mine Workers officials said Monday that about 50 per cent of the more than 20,000 union miners in the state were at work. Spokesmen for the operators said more than 85 per cent were idle.

Operators and union leaders were in agreement, however, that all furnace company mines in this area—mines of the Tennessee Company, Republic, Sloss-Sheffield Steel and Iron and Woodward Iron Co.—were idle Monday.

Incentive Plan Is Caused by Walkout

Chicago

• • • A production slowdown at the sheet and tin mill of U. S. Steel Corp. at Gary hardened into a walkout this week when approximately 900 workers failed to appear for work Monday.

The situation is especially interesting because it is the first test in operation of a new War Labor Board regulation, effective last Nov. 25, providing that an incentive pay plan can be installed without union approval.

An incentive plan in the sheet and tin mill was approved by the company and by WLB, but was never sanctioned by the CIO United Steelworkers Union. Its installation was ordered for Mar. 11, however, and the slowdown began on that day. During the period of lessened output no grievance has been filed by the union.

German Steel Group Formed

Washington

• • • While government experts from the United States study the condition of the German steel industry which has been freed by victorious Allied armies, a recently appointed FEA committee headed by WPB operations Vice-chairman Hiland G. Batcheller will try to decide on the basis of information available here what should be done with German steel facilities after the war. Other committee members are: Carl Adams, President of Air Reduction Corp., and Norman Foy, Republic Steel Corp. executive and special assistant to WPB chairman J. A. Krug.

NEW DESIGN IN AIRCRAFT: Latest wrinkle in private aircraft is the Spratt controllable wing plane, developed in Stout Research Division of Consolidated Vultee Aircraft Corp., Dearborn, Mich. The plane has neither ailerons, rudders, nor elevators which move. The wheel inside the cabin operates through the two pivot bars to the wing, banking the entire wing in either direction, tilting it forward or backward, and thereby controlling direction of the ship.



RFC Requires 6,000,000 Sq. Ft. Of Prefabricated Steel Warehouses

Washington

• • • The gradual cutback of war contracts may do much toward preventing confusion in plant clearance of government-owned equipment, machinery and material, trade association officials here say.

Industrial products declared surplus by owning agencies will move into government warehouses whenever it is determined that the probable disposal value will exceed the cost of storage and transportation. It is RFC's idea to locate these warehouses as close to market areas as possible.

Detailed plans for the removal of government property from private plants have been made so far as feasible by contractors in pre-termination agreements with the services, and RFC district offices have routing schemes worked out to clear property, as it is declared surplus by the services and for storage in designated warehouse space. Further plans should be made to move contractors' tools into permanent position, as government equipment is removed.

The Army and Navy and DPC, principal owners of plant equipment and fixtures, have told manufacturers that the government prefers to store such equipment which would normally be removed, on the contractor's premises, wherever possible.

While warehouse space is at a premium because of Army and Navy preempting (the two services have under their control about 425,000,000 sq. ft.) the RFC plans to increase its total storage space to about 14,800,000 sq. ft. by June 30, and to about 23,500,000 sq. ft. by the end of the year, pursuant to estimates of requirements it has received.

Acquisition of space has been worked out on a mutually agreeable basis between RFC and the owning agencies. In the event requirements have been underestimated, or sufficient space is not available for a number of causes such as retention of plants by the services in standby condition, labor shortage, or a failure to receive required priority assistance, for construction RFC feels that it will be necessary for owning agencies to supplement from their own space a sufficient amount of storage capacity to take care of actual requirements.

The June 30 requirements of RFC

are expected to be filled as follows: Construction of 6,000,000 sq. ft. of prefabricated steel shelters, and 3,895,000 sq. ft. in "theater of operations" or T.O. buildings; and about 4,800,000 sq. ft. in government-owned and leased plants. In the last six months, it is planned to put into storage operation an additional 3,000,000 sq. ft. in T.O. buildings to be constructed, and take over about another 5,000,000 sq. ft. in government-owned plants or leased storage facilities.

The T. O. buildings, containing from 50,000 to 150,000 sq. ft. of space each are being built on concrete foundations, with concrete floors, and with both wood and structural steel framing. Walls are of concrete and fibre composition. Approximately 140 T. O. buildings will use 83 tons of steel each, a total of 11,720 tons.

Storage costs in T. O. buildings are highest paid by RFC, being a little less than \$2 per sq. ft. per year when the costs of acquisition and construction are included. Prefabricated steel storage buildings are \$1 per sq. ft. per year on the same basis, and rentals paid to private warehouses range from 20c. to 35c. per sq. ft. per year.

RFC has set up four steps to be

followed in securing storage space. In order of execution they are: (1) Where possible use government owned buildings; (2) lease private buildings; (3) erect prefabricated steel storage buildings; (4) construct semi-permanent T. O. buildings.

While the ODT is concerned over the impact of industrial surplus freight immediately after VE-Day when munitions shipments will be headed toward the Pacific Coast. No additional cars have been specially allotted for this purpose. Securing freight cars will be a matter of improvisation and last minute work unless ODT changes its mind between now and the declaration of VE-Day by General Eisenhower.

Just as much material as possible will be moved on trucks, RFC says. However, there is a shortage of material handling equipment, and low bed trailer-trucks needed in the movement of heavy machinery. Preliminary estimates show a need for 600 pieces of equipment, with only about 50 received so far.

It is incumbent upon owning agencies for the processing, preparation and the skidding of materials and machinery for transportation, and upon reaching warehouses all surpluses will be inventoried, with receipts forwarded to the appropriate RFC district office for recording.

REPAIRING CARRIER: Two veteran employees of the Puget Sound Navy Yard, Bremerton, Wash., work on the flight deck of the escort carrier U. S. *Sewanee* performing a speedy repair job. Repair work is the top priority item in the yards.



Tripartite Steel Commission Named to Settle Wage Rate Inequities

Washington

• • • Its jurisdiction to apply to the 86 steel companies and any others that it might designate, the WLB has established a Tripartite Steel Commission to administer the section of the Nov. 25 basic steel decision. The section provided for collective bargaining with the view of correcting intraplant wage rate inequities under specific limitations and principles fixed by the board.

The Commission which will hold an organizational meeting in Washington next week will have authority to approve agreements and decide disputes submitted to it pursuant to the decision and resolutions in procedures adopted by the board on Dec. 13 and Dec. 19.

The board said that it will be the duty of the Commission to see that the limitations and principles of the decisions are observed. Principle limitations are that the adjustments be solely to eliminate wage-rate inequities within the plant and not general across-the-board wage increases. The Commission will also be required to observe guide posts for correcting the inequities and to see that the maximum increase for any one company will not exceed an amount equivalent to an average of five cents an hour for all its employees covered by the decision.

The Commission's decision will be final, with the National Board review procedure the same as that provided for regional boards, except that there may be an appeal on the merits of any Commission decision which is claimed to conflict with one or more of the limitations and principles fixed by the board.

Co-chairman and public members of the Commission will be Theodore W. Kheel, NWLB executive director, and William A. Simkin, former chairman of the NWLB Shipbuilding Commission. Mr. Kheel's duties as executive director of the board will not be affected by the new assignment.

Representing labor on the Commission will be Harold J. Ruttenberg, director of research for USW, and Joseph Scanlon, a member of Mr. Ruttenberg's staff. Both are in Pittsburgh.

Industry representatives will be R. C. Cooper, Pittsburgh, assistant vice-president of United States Steel

Corp. of Delaware; Lauson Stone, Pittsburgh, president of Follansbee Steel Corp. J. Paul Cain of American Rolling Mills Co., Middletown, Ohio and A. H. Roosma of Republic Steel Corp., Gadsden, Ala., will serve as alternates. A. M. Tredwell, Jr., of Sharon Steel Corp., Sharon, Pa., and Sydney Evans of Bethlehem Steel Co., Bethlehem, Pa., will be substitutes.

"Steel Castings" Price Schedule Is Revised In Several Details

Washington

• • • Effective April 14, the "production run" provision of Revised Price Schedule No. 41 (steel castings) were eliminated by OPA on April 7. A producer of steel castings no longer will be required to await the completion of a production run to determine the quantity differential to invoice a particular sale, but may use a quantity differential based on the production schedules by the purchaser for any one calendar month.

At the same time, the provisions for transportation charges or allowances on steel castings and railroad specialties were clarified to state clearly that on delivered sales where the transportation is less than 50c. per 100 lb., the producer shall not be required to absorb more than the costs actually paid.

Important!

Paper is a Number One war material shortage—because over 700,000 different war items are wrapped, packaged, labelled, tagged, or made from paper or container board. And the Pacific War, when it speeds up, will require stupendous amounts of paper and board since double and triple packing are required for protection against weather, insects, etc.

So please—

1. Share this magazine with friends since fewer copies are printed, due to the paper shortage;

2. Then put this magazine into paper salvage;

3. And look over your store room to get waste paper of any kind to put into paper salvage.

At present if rail charges on such sales exceed 50c. per 100 lb., the producer is not required to absorb more than 50c. per 100 lb. In some parts of the trade, however, this had been interpreted to mean the producer had to absorb the rail charges up to 50c. per 100 lb.

Another change in the order affects manufacturers of steel castings produced to Navy or Ordnance specifications. After the effective date of the order, manufacturers may charge the ceiling prices provided for such castings for Navy or Ordnance use. Up to this time, the ceilings provided for Army specification castings could be charged only if the castings were to be used for "combat" purposes and for Navy specification, items for "marine, drydock or combat" purposes.

The ceiling prices for castings according to Army or Navy specifications are higher than those for castings produced for industrial use because manufacturers making such castings are required to meet specifications that are different and usually more exacting than those for industrial castings, OPA said.

New record-keeping requirements were laid down by OPA for steel castings and railroad specialties sellers. Sellers, on the order's effective date, must keep records of: (1) The name of each casting sold; (2) the item number; (3) the method by which the ceiling price for the item was calculated; (4) the price charged; (5) the total quantity of each order and monthly requirement schedules; and (6) the number of castings involved in each order and the total shipping weight.

Producers of centrifugal castings may, if they wish, submit cost data to OPA with a request that the agency supply a special ceiling price for the casting for the individual producer.

Pacific Group Elects Officers

Cleveland, Ohio

• • • The Pacific Northwest Chapter of the American Steel Warehouse Association, Inc., has elected the following officers, Walter S. Doxsey, president of the national association, has announced: President, O. J. Ulrich, Pacific Machinery & Tool Steel Co., Portland, Ore.; vice-president, Harry Wolf, Pacific Steel Warehouse Co., Portland; secretary-treasurer, H. F. Morrow, Pacific Metal Co., Portland; chapter director, O. J. Ulrich, Pacific Machinery & Tool Steel Co., Portland.

Report Army Plans to Order 150,000 Tents Using Steel Frames, Roofs

Pittsburgh

• • • An initial order for about 16 steel tents has been placed by the Army with the Butler Mfg. Co., Kansas City, heralding what will probably develop into a really large sheet metal fabrication program. The tents are to be 16 x 32 ft., with steel framing, corrugated steel roofing, and canvas sides and ends. They are to be 5 ft. 9 in. high at the eaves and 6 ft. 9 in. high at the ridge. Whether or not the roofing will be painted or galvanized is not yet settled.

It is expected that from 1200 to 1500 lb. of steel will be required for each tent, and the framing will probably be mainly cold formed strip. One framing member, according to the specification, must have a load bearing strength of 40,000 lb., which may call for a hot rolled section. However, it is possible that even this member may be cold formed from strip of a heavy gage.

Present plans call for 150,000 such units, to be delivered at the rate of 30,000 per month. Butler Mfg. Co. has done considerable experimental and development work in this field and will participate heavily in this business. Other manufacturers who are believed to be participating are the Stran Steel Division of Great Lakes Steel Co., Detroit, and Stout Housing Corp., Detroit. Also interested are Detroit Steel Products Co., and Ceco Steel Products Corp.

The program is interesting in the light of recent WPB actions, since it was only a matter of a few weeks ago that the use of steel was refused for rehabilitation housing in England. Some 30,000 dwelling units have been ordered in the United States for delivery to England, consisting mainly of plywood panel and wood construction.

Steel Shipping Drums Use Regulations Altered by WPB

Washington

• • • Changed for the purpose of providing a more equitable distribution, according to the WPB Containers Division, L-197 has been completely revised so that the base period for calculating quarterly usage of steel shipping drums was advanced from the corresponding quarter of 1943 to the corresponding quarter of 1944.

The revised order now corresponds with other current Containers Division orders and became effective on April 1.

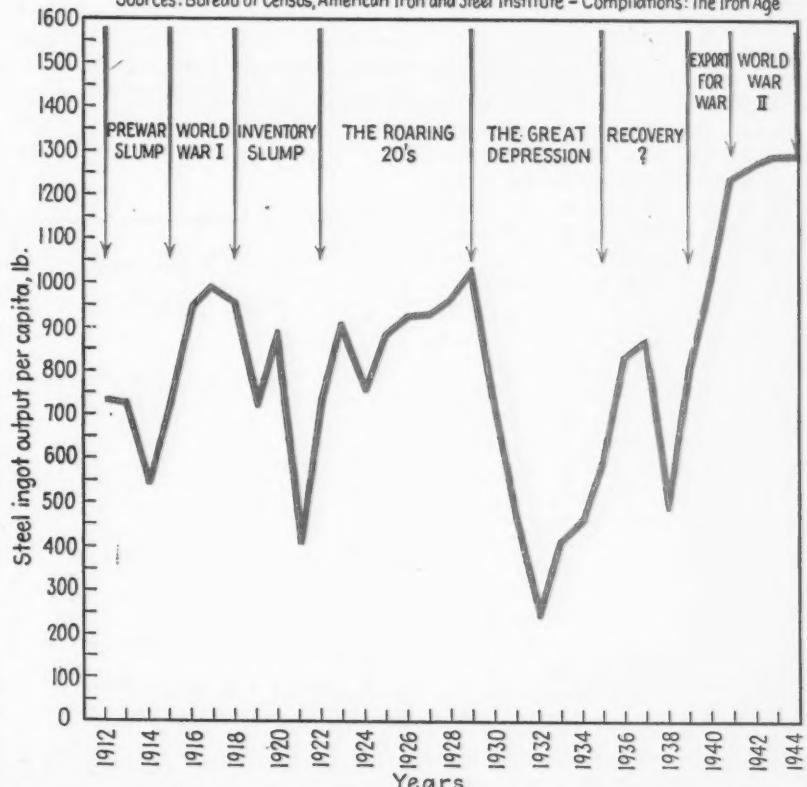
Explaining the change in the base period, the division pointed out that during 1943, when L-197 was new, many items were not allowed to be

packed in steel drums, but subsequently such packing was permitted. During 1944 a large number of adjustments were made to compensate for this variation. By using 1944 as a base period, the division said, such adjustments can be continued automatically without the necessity for reprocessing applications, thus reducing paper work on the part of industry. By basing quotas on actual rather than permitted 1944 usage, any excess quotas will be removed.

PER CAPITA STEEL INGOT PRODUCTION IN POUNDS

(Population Includes Continental U.S. with Armed Service Included)

Sources: Bureau of Census, American Iron and Steel Institute - Compilations: The Iron Age



• The various interpretations which could be drawn from this chart would probably furnish enough material for debates lasting days. At least the trend in per capita production of steel shows that the industry did not expand anywhere near the magnitude exhibited by some other industries. The trend in steel production was apparently headed upward from 1922 to 1930, and it is reasonable to suppose that, discounting the tremendous lift given by war business, it will probably continue at an accelerated rate for sometime after the war, starting from a level higher than that indicated for 1929.

Because of backed-up demand for automobiles, household items, and hundreds of other products made from steel, the production of which was practically supplanted by war business, the primary inventory slump after the present war may not last more than six to eight months. Nevertheless, it is apparent that grandiose ideas on steel production seem to be out of order in view of trends exhibited in this chart. Any substantial increase in steel ingot production per capita of population will derive its main support from replenished desires at home and rehabilitation of foreign countries. After that period is over the per capita of steel may again be affected by factors similar to those which operated from 1930 to 1936. On the other hand, if lend-lease material is returned in kind and if rehabilitated steel plants in Europe must find outlets for their products, these factors, after the reconstruction period, will definitely tend to decelerate any upward movement in per capita consumption of steel.

Army and Navy Detail Their Requirements for Light Metals in Peace

Washington

• • • Postwar use of light metals in order to insure adequate supplies for the national defense was outlined at recent hearings before the Senate Special Committee on Small Business by the War and Navy Departments through the Army and Navy Munitions Board. Since theirs is the highly vital problem of swinging from peacetime to wartime production virtually overnight, as ANMB pointed out, the Army and Navy laid before the committee three big "musts" with respect to aluminum and magnesium.

There must be, the military services said: (1) A peacetime demand for these metals sufficient to promote aggressive development in their production and in their use; (2) a means maintained of accelerating their output with great rapidity, if industrial mobilization on an over-all basis is ever again necessary; (3) no exhaustion of domestic bauxite deposits.

The great importance of aluminum and magnesium to the Army and Navy at this time, when they are plunged into a global war, was graphically illustrated by the statement that the aircraft program alone for both services is consuming aluminum products at an annual rate of approximately 1,700,000,000 lb., and magnesium products at an annual rate slightly in excess of 85,000,000 lb. Requirements for munitions items other than aircraft have shot up to about 230,000,000 lb. for the second quarter of 1945 from 55,000,000 lb. in the third quarter of 1943.

The consumption of aluminum alloys in ship construction has also greatly expanded, as disclosed by figures submitted by Rear Admiral E. L. Cochrane, chief, Bureau of Ships, Navy Department. The aircraft carrier, requiring 2,000,000 lb., is the heaviest user among the naval units. Next comes the battleship, which takes 1,400,000 lb. Consumption by other craft follows: Heavy cruiser, 600,000 lb.; light cruiser, 500,000 lb.; destroyer, 225,000 lb.; large auxiliary, 60,000 lb.; small auxiliary, 20,000 lb.; submarine, 15,000 lb.

Senator Hart of Connecticut, an admiral who fought the Japs early in the war when there were heavy odds against him, asked about the prospects for naval vessels constructed of aluminum in the near future. Admiral Cochrane replied that he was

unable to say that such vessels would soon be adaptable to naval use. He did point out, however, that the weight savings achieved on the various classes of ships by the substitution of aluminum for steel were about equal to the difference between the old and the substituted material. These weight savings, he said, have been employed to increase the useful military load of guns, planes, ammunition, armor, etc., or to compensate for high military weights, thus improving stability and thereby improving the performance of the ships. Later, in 1941, Admiral Cochrane added, the Navy was required to reduce greatly its use of aluminum alloys in the construction of all naval vessels. The reason given was the

demands of the aircraft construction program at that time.

Brig. Gen. F. M. Hopkins, chief, Resources Division Office, War Department, spoke of a new development now underway, which he said may revolutionize the accepted approaches to the problem of disposing of aluminum battle scrap. His reference was to experiments by the Aluminum Co. of America in connection with the process which treats scrap as bauxite, rather than as a metal to be smelted and refined.

SPB Gets Ex-Army Man as New Head

Washington

• • • Col. Alfred E. Howse, Wichita, Kan., took up his duties on April 1 as administrator for the Surplus Property Board. Colonel Howse has had a wide experience in large-scale merchandising and distribution programs. He is chairman of the Wichita Wholesale Furniture Co., and affiliated companies, president of the Forest Hills companies and affiliated companies and partner in the Howse Investment companies.

Col. Howse was given a special civilian assignment in the War Department in the summer of 1941 and in February 1942, was given active duty in the Air Corps at Wright Field, Dayton, Ohio. Subsequently he was executive for procurement on the staff of Lieut. Gen. George C. Kenny, then commanding general of the materiel command. Col. Howse organized and developed the Army Air Forces national procurement operation.

Injured in the spring of 1943 while serving in the South Pacific area as acting chief of staff for the 13th Air Force Supply, Col. Howse was retired in February 1945, and in the interim was regional representative of the Air Corps at San Francisco in charge of all procurement and production activities of the corps in the northern California region. While in that service he developed the China Aircraft Co., a Chinese-owned manufacturing company organized to produce military aircraft in this country for use in China. The plant will be removed to China after the war to produce aircraft for peace time lines. Prior to being appointed Surplus Property Board administrator, Col. Howse was a civilian consultant on the west coast for a national war agency.

Haircut? Shave? War Job?

Washington

• • • Believe it or not, any resemblance to fact in the following report is intentional.

The War Manpower Commission and Army Ordnance has enlisted the aid of more than 4000 licensed barbers in Minnesota. They are putting to work the famed conversational proclivity of barbers in recruiting workers for the top-priority Gopher Ordnance Works, St. Paul, and 21 other war plants in the state.

Every two weeks an illustrated fact sheet is mailed to 4400 licensed barbers giving them the latest information on current manpower needs. The first of these fact sheets pointed out that there are 4839 unfilled jobs in Minnesota war plants and that the Gopher Ordnance Works needs 150 new production workers a day until 4000 are on the job.

The theory behind this novel recruitment drive is that everybody gets a haircut once in a while, or a shave or shampoo, or should. While the barber and his client are making the usual round of conversational subjects, it is felt that he might just as well sell the idea of working in war plants. Barbers are equipped with lists of 33 USES offices in the state, just in case.

"Next, and would you like a war job?"

Concrete Reinforcing Bars

Research Makes Important Contribution

New York

• • • With approximately two years more to go and important results already apparent, research on concrete reinforcing bars, reinforced concrete footings and slabs under the direction of the American Iron & Steel Institute has been under way at the National Bureau of Standards and the University of Illinois for approximately a year.

Deformed concrete reinforcing bars in 17 patterns are now under test at the Bureau of Standards. Some of the 17 are currently available patterns while others have been rolled experimentally for these tests. In the pull-out tests of the bars, stress is applied until the bars pull out of the specimen or the concrete splits. The strength of the concrete used is far above average, 5000 lb. per sq. in. at 28 days, so as to develop a maximum number of test readings from each specimen in order to plot a graph on the effect of the length of embedment. Patterns of bars rolled from new billets and re-rolled from rail steel are included in the tests and recommendations have already been made to several producers as to pattern modifications that might be expected to improve the bond strength of their bars.

Test specimens are cast 8 in. wide, 18 in. deep and either 8 in. or 16 in. in length. Bars 16 in. longer than the block are embedded horizontally a distance of 2 in. from top and bottom. Then blocks are split longitudinally so as to provide a test block 8 in. by 9 in. by either 8 in. or 16 in. in length. This permits a comparison of the relative bond strength of bars embedded under 2 in. and 16 in. of concrete. Blocks are tested in a hydraulic type Southwark-Emery machine.

Tests indicating permissible stresses to be used in designing reinforced concrete slabs and beams, to be conducted by the Bureau of Standards, have been held up until the results of the pull-out tests determine the most suitable deformed bar.

Tests of reinforced concrete square and rectangular footings are under way at the University of Illinois where the last research on footings was conducted by Dr. Talbot between 1910 and 1913. The purpose of the present work is to determine whether the design requirements established then

are still valid and to determine what are critical sections for bending moment, shear and bond. R. R. Zippert, research engineer for the Committee on Reinforced Concrete Research of the American Iron & Steel Institute, estimates that these tests may require three years for completion.

Full size footing specimens are used, 7 ft. sq. by 14 in. to 18 in. in depth. Using concrete with a compressive strength of 3000 lb. per sq. in. at 28 days, some footings have already sustained a load of 550,000 lb. and it is anticipated that footings may be developed to sustain loads of 800,000 to 900,000 lb. By way of comparison, normal concrete at the time of the original footing tests attained a strength of 1340 lb. per sq. in. at 67 days, as determined by 6 in. concrete cubes. The program includes the test of 20 wall-type footings with a 5 ft. base for exterior building walls and 160 square and rectangular footings. Plain and deformed reinforcing

bars of current and newly developed pattern are employed in the tests. Both straight bars and hooked bars are also under test.

A Southwark testing machine with a tensile or compressive capacity of 3 million lb. is employed for these tests. Helical springs, with a loading capacity of 6500 lb. each when fully closed, support the concrete footing in the machine. Pressure is applied by a 14 in. square block at the center of the 7 ft. square footing. Deflection under load is measured at several points along the footings and the amount of slip of bars permitted to extend from the footing is also determined.

Mechanical Shell Loading Equipment Installed on Lines

Ravenna, Ohio

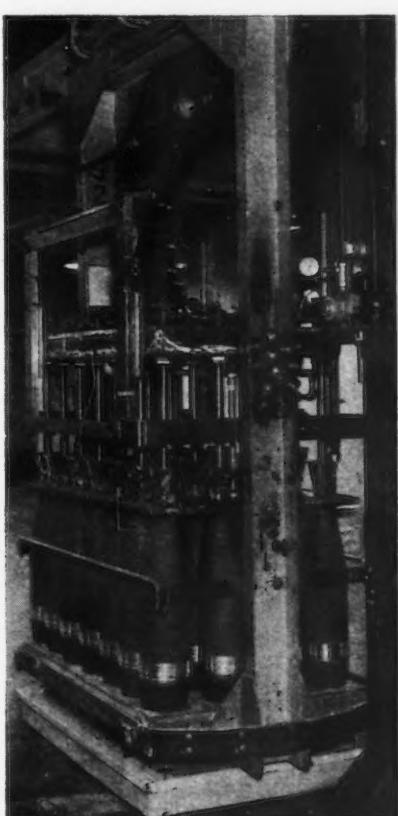
• • • Mechanical shell loading equipment, which Ordnance officials estimate will save 4,900,000 manhours this year, is now being installed at the Ravenna Ordnance Center, officials announced recently.

The new process has been thoroughly tested and is now being standardized in arsenals throughout the country. One production line has already been converted to mechanical loading, with two others prepared to make the switch as soon as manufacturers supply the new equipment.

This new method dispenses with the years-old hand bucket pouring and results in higher manpower savings in direct proportion to the size of the ammunition. Col. C. W. Meldrum, commanding officer of the Ravenna Ordnance Center, illustrated the increasing ratio of manhour conservation in revealing that "only two workers are saved in loading 15,000 57-mm shell, while 100 workers are saved in loading 15,000 240-mm shell."

Officials of the Atlas Powder Co. which operates the center, describe the new loading mechanism as consisting for the most part of two machines, a multiple pouring device, and a multiple core machine.

The pouring machine first funnels pre-measured quantities of liquid TNT into the cases; next, the core mechanism probes the TNT to the base of the shell with a steam heated bayonet to eliminate air cavities. After the bayonet finishes its work, the remaining space in the shell case is filled by another pouring from the first machine.



Cleveland's Share Of Postwar Jobs About 600,000 Estimated

Cleveland

• • • Postwar jobs for 600,000 persons, 150,000 more than were employed in early 1940, which will require each industry here to increase its employment one-third over 1940 levels, must be found if Cleveland is to supply its share of Henry Wallace's national goal for postwar employment.

These estimates were made recently by C. J. Perrier, deputy regional director of the Smaller War Plants Corp., and vice-president of Smead & Small, Inc., in the first definite appraisal of the probable postwar situation here.

Basing his figures and conclusions on a survey made to determine whether there will be enough jobs for returning servicemen, Mr. Perrier said concerning the employment outlook after the war:

"If we are to attain the 600,000-job goal we must find work for the 450,000 employed in 1940, for those on work relief that year, those unemployed in 1940, 35,000 people who normally enter the labor market in a five-year period and 20,000 immigrants—the estimated number who may not be expected to return to their former environment.

"Manufacturing industries, particularly the big industries, seem to be way out in planning postwar jobs. But some of the other industries seem to be lagging badly in their plans for higher postwar employment."

To find out which industries could be counted on to hire their proportion of the 150,000 additional workers after the war, Mr. Perrier got detailed reports from 36 representative firms in five industries.

Eleven manufacturing industries indicated they could hire 34 per cent more people after the war than they did in 1940. These firms—Cleveland Graphite Bronze Co., Arco Co., Cleveland Steel Products Co., Eaton Mfg. Co., General Electric Co., Harshaw Chemical Co., National Malleable & Steel Castings Co., Standard Oil Co. of Ohio, Thompson Products Co., Warner & Swasey Co. and White Motor Co.—employed 23,885 in 1940 and 56,790 in 1945. They estimated their postwar employment at 32,095.

But none of the other industries indicated postwar employment anywhere near the one-third increase aimed at to provide jobs for all. Here's the increase over 1940 employment these categories have been able to plan so far:

Transportation and communications, 28 per cent; wholesale and retail trade, 5 per cent; finance, insurance and real estate, 5 per cent; and personal services, laundries and hotels, 5 to 15 per cent.

Surplus Disposal Jurisdiction Being Outlined by Board

Washington

• • • The Surplus Property Board on April 7 designated disposal agencies and the properties they are to handle with the issuance of its first regulation.

Generally, the regulation is the same as the one issued by the Surplus War Property Administration, except changes were made in the disposition of real estate and the sale of surplus property in United States Territories and possessions.

The regulation provides that all surplus real property be reported by the owning agency to the SPB, which will make classification of it as the law requires and assign it for disposal to an appropriate disposal agency.

Farm lands are assigned to the Department of Agriculture; grazing and mineral lands are assigned to the Interior Department. NHA will sell land owned by the government in connection with housing developments. RFC will still sell plants and contiguous properties.

The Board, however, may assign any specific tract of land to any disposal agency regardless of classification, in cases where such an assignment will facilitate disposal.

Changes in territorial disposal are as follows: RFC will sell surplus aircraft in territories; the Maritime Commission will do the same for ships; WFA will dispose of food; the Interior Department will dispose of all other types of property in territories and possessions where it is charged with the general administration of those areas.

In addition, the regulation contains a provision whereby the board may make assignments of property to any other domestic or territorial disposal agency in instances where such action appears feasible. This is intended to allow maximum flexibility and efficiency of operation in areas where regular disposal facilities may not be quickly available.

Order No. 1 accompanying the regulation, provides an explanatory list of the classes of property assigned to the disposal agencies. Addresses of disposal agency offices where declarations of surplus are to be filed by owning agencies are listed in Order No. 2. The prescribed forms for use by owning agencies in making declarations of surplus are reproduced in Order No. 3.

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Railroads Purchase More Steel Products in 1944

Washington

• • • Reflecting an increase of \$115,805,000, Class 1 railroads in 1944 purchased iron and steel products to the value of \$526,608,000, compared with

\$410,803,000 in 1943, according to a recent report by the Association of American Railroads.

Purchases by classes of products for the two years follow:

	1944	1943
	(Thousands of Dollars)	
Steel rail (new and second hand).....	\$ 75,763	\$ 60,074
Wheels, axles and tires.....	48,781	44,550
Frogs, switches and crossings and parts of same.....	26,114	22,919
Track fastenings, track bolts, spikes, etc.....	55,229	43,804
Iron bridges, turntables and structural steel.....	4,348	3,827
Bars, spring steel, tool steel, shapes, wire netting, chain, sheets, etc.....	36,044	28,868
Forgings and pressed steel parts for locomotives.....	4,833	3,414
Forgings.....	20,344	11,367
Flues and tubes.....	7,732	6,450
Interlocking and signal material.....	23,147	18,152
Telegraph, telephone and radio material.....	4,638	2,832
Bolts, nuts, washers, rivets, etc.....	13,452	11,481
Springs, helical and elliptical.....	5,869	5,592
Locomotive and car castings, beams, couplers, frames and car roofs.....	66,114	49,440
Track and roadway tools all kinds, miscellaneous track material and wire fencing. Motor, hand, push and velocipede cars and parts.....	11,599	8,440
Machinery and repair parts, including all power driven shop machinery.....	8,842	4,383
Machinery, boilers, repair parts and all other iron and steel products.....	17,009	11,384
Pipe, iron and steel and fittings.....	8,726	7,118
Hardware.....	6,962	6,255
Hand and small machine tools and parts.....	13,821	10,285
Air brake material.....	29,248	21,552
Standard and special mechanical appliances for locomotives.....	21,208	18,478
Automotive equipment and supplies.....	16,679	10,158

NEWS OF INDUSTRY

WPB Tightens Ratings For Metal Strapping To Conserve Supply

Washington

• • • Because the demand for metal strapping has exceeded supply, it has been necessary to issue Order P-152 to insure that the most essential needs are taken care of first, WPB said on April 7.

The order permits any person to use an AA-1 rating to buy metal strapping for the following uses: Car-loading, skidloading, baling and bundling. Strapping used for these purposes conserves or replaces critical lumber, nails, bolts, paperboard, labor and shipping space.

The order also permits persons who use metal strapping for container reinforcement to use the rating assigned for the container it reinforces in accordance with Order P-140, wooden shipping containers, and P-146, fibre shipping containers. It also permits use of an AA-5 rating for the procurement of reinforcing edges.

Preference ratings assigned or permitted to be used by P-152 may be extended to any unfilled order for strapping tools, accessories or fittings placed prior to April 6. However, all orders for metal strapping placed prior to April 6 must be re-rated in accordance with the new order within 45 days.

A certification is provided for use in applying or extending ratings assigned or permitted by the order. Inventories in the hands of persons other than distributors, manufacturers or the Army or Navy, are limited to \$300 worth of strapping, or 45 days inventory, whichever is greater.

Pittsburgh Steel Co. Cancels DPC Projects

Pittsburgh

• • • Pittsburgh Steel Co. reports net sales for 1944 amounted to \$59,717,008, compared with \$66,624,190 in 1943. Net profit for the year was \$672,364, compared with \$1,734,222 for 1943. The sale of undeveloped coal lands in the Freeport vein and minor properties resulted in a loss of \$1,289,409, of which sum \$585,000 is taken up in the profit and loss for the year 1944, and \$704,409 is charged to surplus.

The company reports that during the year it was determined that the

potential production of the blast furnace and the additional equipment for the open hearth department at Monessen, which was constructed as an agent for DPC, was no longer urgently needed. Accordingly, the lease agreements with DPC covering these two projects were cancelled, and the work, except that involving the boiler installation for the blast furnace and its auxiliary equipment, was suspended.

Tinplate Short For Authorized Canning

Flemington, N. J.

• • • There is not enough tinplate available to the can manufacturing industry to meet increased Army and Navy requirements, take care of this year's perishable food packs and supply cans for products which WPB conservation orders permit to be packed in metal, D. W. Figgis, president of American Can Co., told stockholders at the company's annual meeting here. He said that priority regulations make it mandatory that in the event of shortage, manufacturers of containers for perishable foods and military requirements eliminate all but the most essential non-food items such as medicines, and defer furnishing cans for non-perishable products until after the canning season.

"Even with these precautions," Mr. Figgis stated, "unless the course of the war frees more metal for cans, it may be necessary for the armed forces to consent to substitute packages for some of their supplies in order to prevent perishable food from going to waste." The pinch in the metal situation resulted, he said, when the Army and Navy demanded metal containers for a substantial part of their requirements of products formerly shipped in other types of packages.

COMING EVENTS

April 12-14—Electrochemical Society, Inc., Philadelphia—Atlantic City Congress, Atlantic City, N. J.

CANCELLED

April 26-27—Annual Conference, Open-Hearth Steel Committee and Blast Furnace and Raw Materials Committee, Iron and Steel Division, AIME, Chicago.

April 30—May 4—American Foundrymen's Association, Detroit.

May 21-22—American Steel Warehouse Association, 1945 Convention, New York.

May—American Gear Manufacturers Association, general meeting.

May—General Meeting, American Iron & Steel Institute, New York.

Three New Advisory Committees Formed By Steel Division

Washington

• • • Formation of the Stainless Steel Technical Industry Advisory Committee, the Super Alloys Technical Industry Advisory Committee and the Malleable Axle Housing Scheduling Industry Advisory Committee was announced recently by Josiah G. Fort, director of the WPB Office of Industry Advisory Committees and William B. Todd, director of the WPB Steel Division. Mr. Todd said that the chief function of the Stainless Steel and Super Alloys Committees will be to give advice on technical production matters. The Malleable Axle Housing Committee will concern itself with scheduling procedures. The government presiding officer of the Stainless Steel Committee will be W. B. Pierce, chief, WPB Stainless Steel Branch. Russell Franks, chief, Super Alloys Branch, will be the government presiding officer of the Super Alloys Committee. The memberships of the committee are:

Stainless Steel Technical Industrial Advisory Committee: D. C. Buck, Carnegie-Illinois Steel Corp., Pittsburgh; F. B. Lounsbury, Allegheny-Ludlum Steel Co., Brackenbridge, Pa.; G. V. Luerssen, Carpenter Steel Co., Reading, Pa.; C. G. Merritt, Crucible Steel Co. of America, Harrison, N. J.; J. O. Rinek, Universal Cyclops Steel Co., Bridgeville, Pa.; E. C. Smith, Republic Steel Corp., Cleveland.

Super Alloys Technical Industry Advisory Committee: Mr. Lounsbury, Mr. Smith, Mr. Rinek, Mr. Luerssen; R. L. Wilson, Timken Roller Bearing Co., Canton, Ohio; F. S. Badger, Haynes-Stellite Co., Kokomo, Ind.; John Jupenatz, Lebanon Steel Co., Lebanon, Pa.; A. D. Shankland, Bethlehem Steel Co., Bethlehem, Pa.; T. F. Olt, American Rolling Mill Co., Mid-dletown, Ohio.

Malleable Axle Housing Scheduling Industry Advisory Committee: Anthony Haswell, Dayton Malleable Iron Co., Dayton, Ohio; W. H. Moriarty, National Malleable & Steel Castings Co., Cleveland; James Smith, General Motors Corp., Danville, Ill.; F. W. Boynton, Standard Steel Spring Co., Madison, Ill.; George Veale, Eaton Axle Co., Cleveland; Vincent Gumbleton, Timken Detroit Axle Co., Detroit; L. D. Harkrider, General Malleable Corp., Waukesha, Wis.

Tooling Requirements Deliveries About Same

Detroit

• • • Deliveries on tooling requirements have eased very slightly since the first of the year, but the changes recorded have been insignificant.

One group of companies reporting to the Automotive Council for War Production tooling information service had a total of 9,340 men on their payrolls at the start of April, compared with 9,336 in January.

The average delivery promise on jigs and fixtures is now fractionally below five weeks; three months ago it was fractionally above five weeks. Gage promises run less than three and one-half weeks on an average, against almost four weeks at the start of the year. Cutting tool deliveries can be made in two weeks, as before. The average delivery promise on sheet metal dies continues slightly over four and one-half weeks, about the same as at the start of the year.

Current delivery promises now have adjusted to approximately the same length as prevailed a year ago.

Lake Ore Deliveries Start

Cleveland

• • • The first boatload of iron ore to be delivered at a Lake Erie port this season arrived in Cleveland recently when the steamer George A. Fink docked with 9493 tons of the war-vital material in her hold.

Dug from Michigan's Menominee range, the ore was loaded at the Chi-

cago and Northwestern Railroad dock at Escanaba. It is owned by the National Steel Corp. and will probably go to mills at Weirton, W. Va.

Cleveland, leading ore unloading port in the world, last year unloaded 12,569,464 long tons (2240 lb. per long ton). The record year was 1942 when 13,799,639 long tons were unloaded.

In the Lake Superior district, the early ore movement was checked abruptly by a snowstorm and high winds, which halted most work atop the tall ore docks at the north end of Lake Superior and some ore was frosted to the cars. Most open pit mines, already muddy enough to limit mining operations, were reported shut down.

Tinplate and Terneplate Can Usage Reduced Further

Washington

• • • WPB on April 6 reduced by 60 per cent the quotas of tinplate or terneplate cans packers may use for packing paint products, in a revision of order M-81. The previous quota was 100 per cent of 1941 usage. The paint products covered by the order include pigment oil paint, varnishes, aluminum paint, paste water paints, and lacquers.

The amended order also sets a quota of 25 per cent of 1941 usage for cans for packing motor oils, and 100 per cent of 1944 usage for packing insecticides and fungicides. These items were not included in the quota list of the order previous to its amendment.

Plans Construction Of Additional Can Plant

New York

• • • The contract value of unfilled war contracts and orders on the books of the Continental Can Co. and subsidiaries was reported by the company at between \$40,000,000 and \$45,000,000. Although the sales for the first two months of the current year were over 50 per cent ahead of the corresponding period of 1944 and showed an encouraging trend, Carle C. Conway, chairman of the board and president, pointed out that they were not indicative of the probable sales for the full year.

Commenting on the recent sale by the company of 150,000 shares of \$3.75 cumulative preferred stock without par value, at a price of \$102.50 per share, Mr. Conway stated that he felt this financing was on a favorable basis to the company, providing it with a permanent capital of approximately \$15,000,000. These funds, according to Mr. Conway, are to be used to finance in part a program of capital improvements and additions when conditions permit, including completion of an additional can plant at St. Laurent, Quebec, now under construction; construction of new plants to replace present leased properties at Wheeling, Kansas City, Canonsburg; erection of a new plant at Havana, Cuba; the completion of a can-making machinery program started prior to the war; and the providing of other necessary facilities such as warehouses at manufacturing locations, and can closing machinery.

WPB Redefines Order M-126

Washington

• • • Stainless steel has been redefined in a newly amended M-126 Order to bring it into conformity with the stainless steel definition in the steel Order M-21 A, WPB said April 7.

In the amended order, the term stainless steel means heat or corrosion resisting steel containing 4 per cent or more of chromium with or without nickel, molybdenum, or other elements.

M. A. Hanna Election

Cleveland

• • • At the annual meeting of stockholders of The M. A. Hanna Co. recently, all directors were re-elected. No director was elected to fill the vacancy caused by the death of H. M. Hanna, chairman of the board.

Lake With

Cleveland
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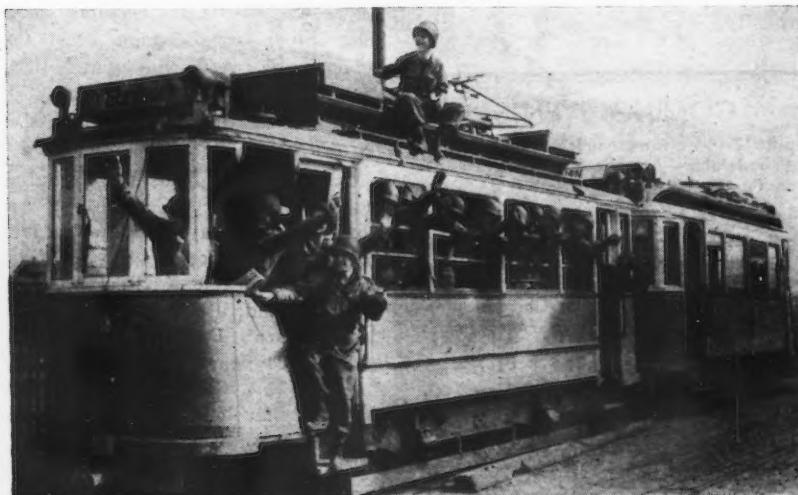
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GERMAN TROLLEY RIDE: Victorious Yank fighters of the 9th Armored Division, U. S. First Army, wave from the platform and windows of a German trolley, in the captured town of Neuwied, Germany.



Lake Season Opened Officially With Passage of Canadian Vessels

Cleveland

• • • Faced with manpower shortages and possible coal strike difficulties, operators and skippers of the nation's industrially vital Great Lakes cargo fleet opened their fourth season of World War II, on March 25, 10 days ahead of last year.

Despite Senate War Investigating Committee assurances that the outlook for shipping on the Great Lakes has improved, vessel sources informally mention manpower shortages aboard ship, at docks, in the iron ore mines, and a threatened bituminous coal strike as potential barriers in their path.

Estimates by government agencies have placed 1945 iron ore transportation requirements at 83,000,000 gross tons compared with 81,171,438 in 1944 and the all-time record of 92,076,781 in 1942. Coal tonnage for 1945 is estimated at about 60,000,000 tons, equaling that of 1944.

It has been reported that many lake seamen have accepted salt water berths to meet manpower shortages on the seas, but it has been predicted that a high percentage of these will return to the ore, coal, and limestone life lines.

Coal production and its transportation by rail to lake ports has a very definite bearing on season tonnages. If it is unavailable at lower lake docks, ore carriers make the up-bound journey light. To this extent the fleet's record for the season is affected.

While it may be necessary for the

lake fleet to obtain permission to proceed with less than normal crews, the War Shipping Administration is making available 10 of 36 boats which represented part payment on 16 new vessels.

To facilitate early season Great Lakes commerce, the U. S. Coast Guard has its icebreaker fleet in readiness, led by the new Mackinaw. Two Canadian vessels, however, have already negotiated the Sault Ste. Marie River unaided, with grain cargos.

ASME Milling Research Continues

New York

• • • At least 40 research projects, undertaken at the request of the government to aid industry in adopting more efficient production methods, have been carried out during the past year by the Manufacturing Engineering Committee of the American Society of Mechanical Engineers, it was announced recently by the committee through its executive secretary, Richard B. Smith.

The committee was organized by the society at the request of the War Production Board through the Office of Production Research and Development. Much of the committee's work has dealt with the dissemination of information about high-speed milling.

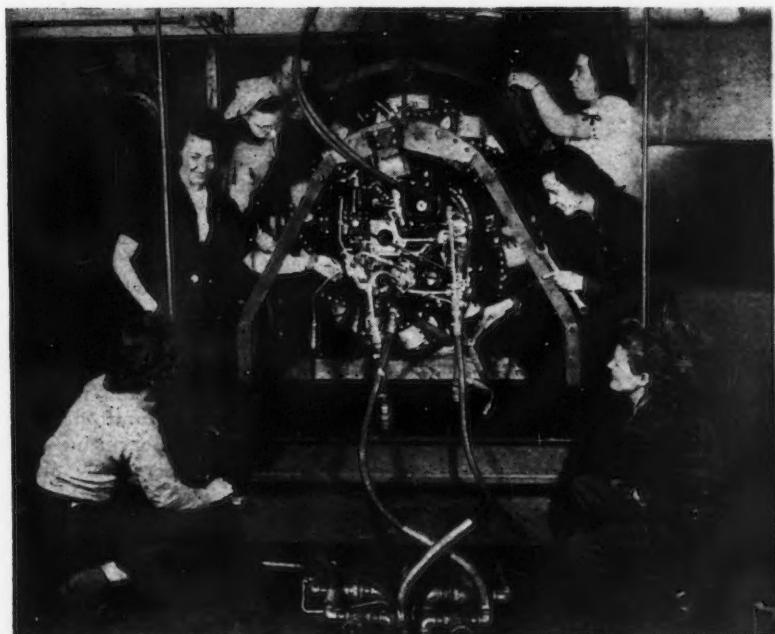
Machine shops all over the country have been experimenting in this field in an effort to increase machine speeds, and lower costs. Much, if not most of the research, has aimed at improving and speeding up existing equipment without increasing manpower, as a partial means of solving the manpower shortage.

The high-speed milling project is now being carried out at California Institute of Technology under a contract between the college and the WPB. Because of the project's great value to the war effort, expert operating personnel has been loaned by war plants on the coast for this project, under the committee's aegis.

At the beginning of the war, for example, one aircraft company found that in order to meet its quota of planes a minimum of 1600 additional milling machines were necessary. These would have required 3200 skilled operators. The total cost would have exceeded ten million dollars. To obtain that number of milling machines was out of the question, nor was there time either to build the additional machinery, or train the necessary operators.

The committee recently told how industry discovered that speeds as high as 24,000 ft. per min. in machines cutting aluminum were practical instead of two to three thousand feet. It also was found that feeds of 200 to 300 in. per min. could be used instead of 15 or 20. In a few months such milling machines as the research had demonstrated to be practical, were installed in several aircraft plants. The particular company which would have been called upon to spend ten million dollars met its quota of planes with less than 15 additional machines and less than 25 more skilled operators. The cost, instead of being ten million dollars, was less than half a million.

TESTING JET: On the test stand at General Electric's Lynn, Mass., plant, only the accessory end of this jet aircraft engine can be seen. Mounted at the forward end of the engine, the accessories appear similar to those on reciprocating engines.



West Indies Laborers To Be Imported for Youngstown Steel Plants

Youngstown, Ohio

• • • Approximately 450 foreign workers, including Jamaicans, Barbadians, and other West Indies laborers, are soon to be given jobs by Republic Steel Corp. and Youngstown Sheet & Tube Co. here.

These workers are being brought to Youngstown as soon as arrangements can be made to relieve the manpower shortage in the steel industry, Dr. Joseph E. Smith, area director of the War Manpower Commission, said recently.

Youngstown Sheet & Tube will be given 350 of the laborers and Republic Steel the remainder. Republic's Warren plant recently put 100 such workers on the payroll. This importation of the West Indies workers has been approved by labor and management committees in the area. Ralph Emmons of the state office of WMC had been in Youngstown helping to find housing, but according to Dr. Smith, no plan has been worked out yet.

Dr. Smith explained that the workers to be imported have been carefully selected, and foreign labor is brought in only when local manpower is insufficient. They will handle heavy labor and jobs which women cannot do.

Hired on 90-day contracts which are

renewable as conditions warrant, the Jamaicans come here under temporary permits from the Department of Immigration and Naturalization and can work only in places where plants have contracted for their services through the WMC. However, WMC may terminate these contracts at any time, if cutbacks are necessary or if the local labor supply becomes adequate.

Most of the Jamaicans in Ohio at present are employed in Akron, Wadsworth, Barberton, Medina, and Orville, working in foundries, food processing plants and match manufacturing establishments. They are to be paid prevailing wage rates and, in turn, pay social security charges and income taxes.

Steel Co. of Canada To Build Sheet Units

Toronto

• • • Ross H. McMaster, president of the Steel Co. of Canada Ltd., says that the company has embarked upon the second stage of a program for the installation of hot and cold strip mills to increase production and add to the range of sheets manufactured, as well as furnish black plate for tinning in the plant now operating on purchased materials. To the new plate mill, erected in 1941, a six-stand 56-in. hot strip finishing mill is being added with an annual capacity of 400,000 tons of rolled strip and sheet.

Reviewing operations for the past year, the president stated that heavy demand maintained operations at full capacity and imposed a heavy strain upon personnel and equipment. Steel ingot production exceeded any previous record in spite of an almost

chronic shortage of manpower. The tonnage of purchased steel processed also increased and sales in value reached a new high mark.

Dealing with the price situation for iron and steel products, Mr. McMaster stated: "Notwithstanding that advances have been made in steel prices in the British, Australian, and United States markets, Canadian prices of many steel products still remain at 1939 and earlier figures. The steady increase in all cost factors, largely permanent in character, has eliminated any margin in the case of certain products, and the maintenance of total profits is due principally to the greatly increased volume of sales and the high average grade of products furnished for war purposes. Unless price advances are permitted, profits will shrink materially with the decline in production following any substantial cut in the war demand. It is hoped that some adjustments in prices may be permitted prior to the advent of the postwar period."

HOWITZER: Captured by Yanks in Germany, this 15 in. howitzer is mounted as a special weapon on a Royal Tiger tank chassis.



Wire Association Elects D. D. Buchanan As President

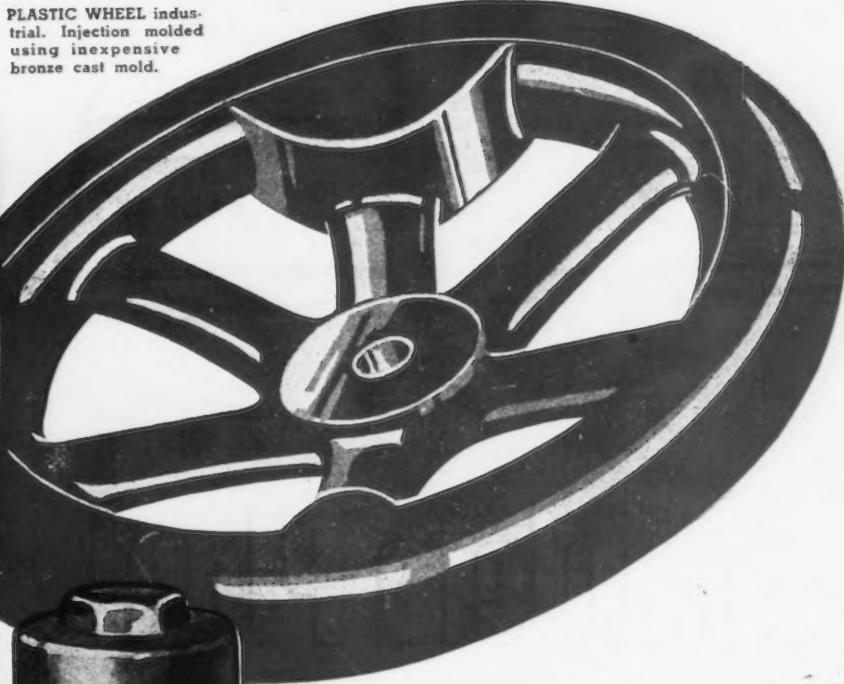
New York

• • • The Wire Association recently elected the following officers for the 1945 term: president, D. D. Buchanan, manager of operations, Union Drawn Steel Division, Republic Steel Corp., Massillon, Ohio; vice-president, R. M. Hussey, superintendent, Wire Department, Jones & Laughlin Steel Corp., Aliquippa, Pa.; 2nd vice-president, E. W. Gundstrom, assistant plant manager, Rome Cable Corp., Rome, N. Y.; executive secretary, Richard E. Brown, publisher, Wire & Wire Products, 300 Main St., Stamford, Conn.

Kenneth B. Lewis, Consulting Wire Mill Engineer of Worcester, Mass., was appointed chairman of the Ferrous Division Program Committee and Sidney Rolle, assistant secretary of Scomet Engineering Co. of New York, was appointed chairman of the Non-ferrous Division Program Committee.

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PLASTIC WHEEL industrial. Injection molded using inexpensive bronze cast mold.



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METAL STAMPING
PLASTIC with METAL**



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OUR PLASTIC DIVISION . . . furnishes custom molding in all thermoplastics from a fraction of an ounce up to 18 ounces per shot.

OUR METAL DIVISION . . . fabricates in all heavy and new light metals. Drawing, Coining, Stamping, Welding, Rolling, Forming.

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SALES OFFICE — W. GRAND BLVD., DETROIT, MICH.

NEWS OF INDUSTRY

**Pennsylvania Engines
Are Multi-Cylinder
Design for Economy**

Philadelphia

• • • Fifty multi-cylinder steam locomotives, to pull freight trains on fast schedules, were described recently by the Pennsylvania Railroad. Twenty-five engines will be built by the Baldwin Locomotive Works, and twenty-five engines and fifty tenders in the Altoona, Pa., shops of the railroad. The new locomotives will go into service this year.

Known as class T1, the new engines will be used on the Pennsylvania's main steam lines west of Harrisburg, Pa. They are designed to increase the economy of operation in the through passenger and freight services. Two T1 engines already have been built and have been in use for some time.

The T1 engine is the fourth newly designed type of coal-burning steam locomotive to be announced recently by the Pennsylvania. The others include a multi-cylinder, heavy duty locomotive, class Q2, now also being built in quantity; a steam turbine locomotive, type S2, recently completed and placed in test service; and the "Triplex" steam turbine locomotive, announced a few days ago.

The Pennsylvania Railroad now has in service and on order eighty multi-cylinder engines that, in addition to other advantages, provides smoother power than the conventional two-cylinder locomotive.

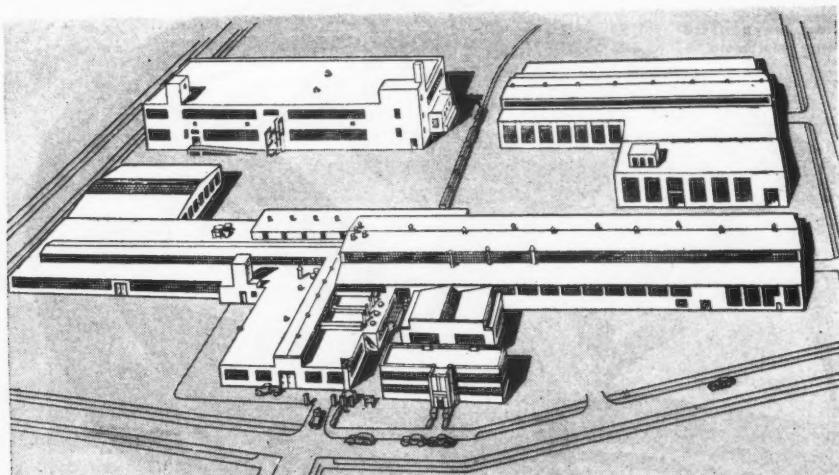
Completely streamlined, the new T1 engines, with tenders, will be approximately 123 feet long, 15½ feet high, and will weigh 930,200 pounds in working order. Driving wheels will be 80 inches in diameter, steam pressure 300 pounds to the square inch, and starting tractive effort 64,650 pounds.

**Henry F. Pope Leaves
Firm Chairman's Job**

Cleveland

• • • At the 78th annual meeting of National Malleable & Steel Castings Co., Cleveland, held on March 28, Henry F. Pope, chairman of the board of the company since 1934, announced to the shareholders that he would ask the newly elected board of directors not to consider his name for re-election. All of the present directors, including Mr. Pope, were re-elected by the shareholders.

At the organization meeting of the



Complete Plant Facilities

...another important reason why it pays to work with Ampco as your main source of bronze parts

The distinctive properties of Ampco Metal — its resistance to wear, impact, fatigue, and corrosion — its ability to last several times as long as ordinary bronze — are available to you in a form that fits your needs. This is true because Ampco is completely equipped to produce and work the metal by every commonly used process. By constant research and experimentation, Ampco has continually added new processes, giving results heretofore impossible with this particular material.

Specify Ampco Metal with confidence that the Ampco organization can provide the engineering and production "know-how" and the specialized plant facilities to deliver the part you want.

Ampco Metal

Diversified production facilities

Facilities for working the metal by every metal working process in general use

Production Control Methods

Ampco Metal, Inc. Specializes in ENGINEERING, PRODUCTION, FINISHING BY COPPER BASE ALLOY PARTS

A-9

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Dept. IA-4, Milwaukee 4, Wis.

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Metal
The Metal without an Equal

Ampco Field Offices in Principal Cities

This new Ampco book — sent free to engineers and executives — may suggest additional improvements in bronze parts or a better way of fabricating them. Ask for it today.

"It's Steel!"

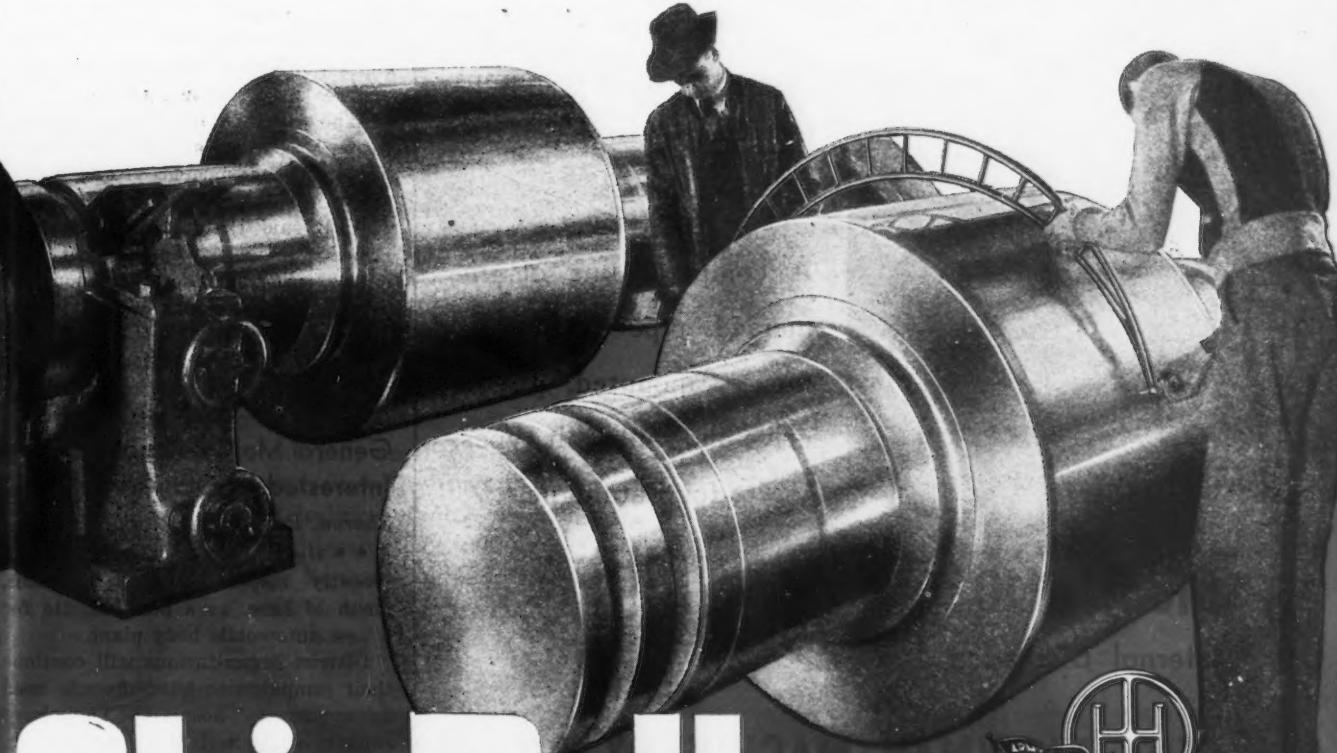


Steel needs no explanation or qualification. Its qualities are not predicated on "ifs and ands." In whatever form or in whatever product, America looks upon steel as the symbol of all that is strong and enduring.

With such an established acceptance and preference, it is apparent that products made of steel will be in

greatest demand after the war. A peacetime production emergency which will tax the capacity of industry is certain to result.

Ohio Steel will help by producing rolls *right* and in the shortest possible time—and by continually striving to make better rolls than have ever been made before.



Ohio Rolls

THE OHIO STEEL FOUNDRY COMPANY
LIMA AND SPRINGFIELD, OHIO • ENGINEERS • FOUNDERS • MACHINISTS



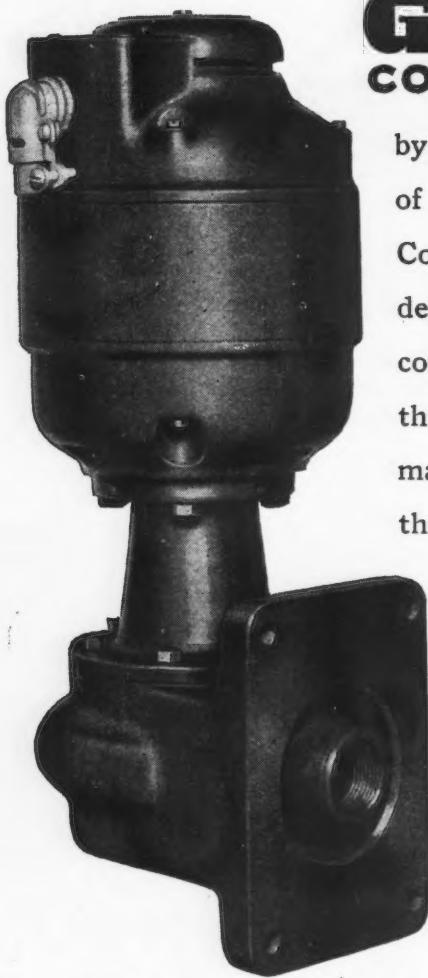
SELECT FROM THESE 9 TYPES OF OHIO STEEL
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Rolls . . . Flintuff Rolls.

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Internal Discharge Type

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1821 READING ROAD

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The "GUSHER"—A Modern Pump for Modern Machine Tools

NEWS OF INDUSTRY

directors which followed, Mr. Pope's request was acceded to and the office of chairman left vacant. Other officers were re-elected.

Mr. Pope has been active in the company since he began as office boy with the predecessor, Cleveland Malleable Iron Co., in 1884, and has served in various capacities including those of assistant treasurer, vice-president and president. He has been a director since 1899.

Following the meeting of the directors, Charles H. McCrea, president, announced that W. H. Moriarty, assistant to the president, responsible for the direction of general policies and coordination between the five plants of the company for all industrial sales, had been assigned the additional duties of assisting in the administration of the railway sales department.

Steel Pipe Supplies Cut in Second Quarter

Washington

• • • Steel pipe supplies for maintenance and repair and for minor plant additions that utilities may schedule for delivery during the second quarter have been limited to 20 per cent of pipe deliveries in all of 1944. This action was taken under Direction 4 to Utilities Order U-1, issued by the WPB Office of War Utilities. An exception in the directive provides that utilities may schedule up to 10 tons of pipe without a cut from last year's rate. Exceptions also are provided to allow for unexpected property loss due to flood, explosion, etc.

WPB said that the direction was issued in line with a Requirements Committee program determination reflecting cuts in deliveries of steel for the second quarter all through the economy to make way for stepped up military schedules.

General Motors Reported Interested in Old Army Camp Sharon, Pa.

• • • General Motors Corp. engineers recently inspected Camp Reynolds, north of here, as a possible site for a new automobile body plant.

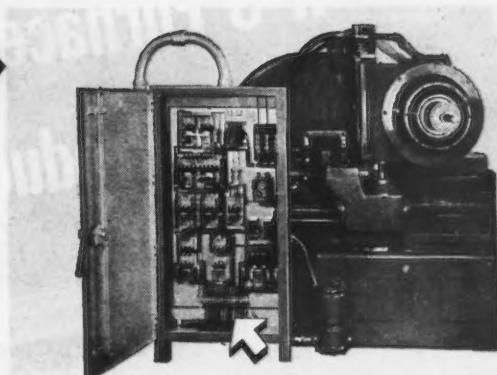
District organizations will continue their campaign to have the site used as a veterans' hospital. They have support of Pennsylvania congressmen.

No action on the use of the camp, unused since December as a replacement depot, can be taken until the War Department formally classifies it as non-essential.

Here's Why MORE AND MORE MACHINE TOOL USERS ASK FOR...

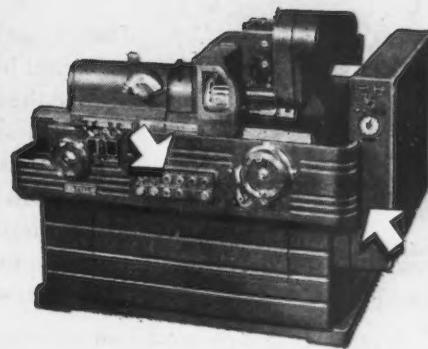
Square D Control

Because the Square D line of machine tool control is so unusually complete, practically any performance requirement can be met with standard devices. These standard devices, designed to perform many different functions, are physically proportioned to make up compact, attractive control panels.



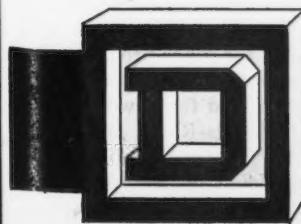
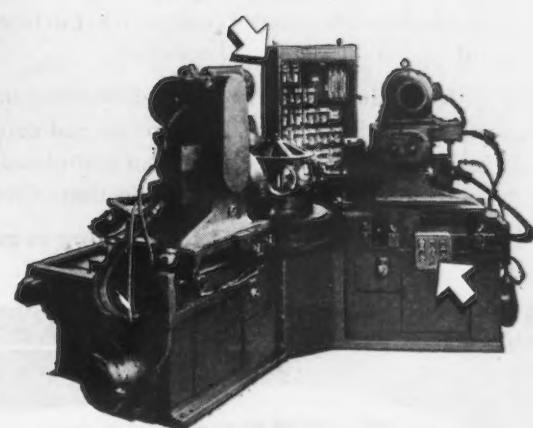
Square D Control

Magnetic starters and contactors, vertical action type, are designed specifically for the exacting requirements of machine tool control which include ample electrical capacity, fast response and long mechanical life. Square D accessories include push buttons, precision limit switches, pneumatic timing relays and terminal blocks.



Square D Control

Square D Field Engineers have had years of experience in designing electrical control for machine tools. They are fully qualified to work out line diagrams for desired operation sequences. Their suggestions are carefully analyzed and confirmed by factory engineering departments with complete research and testing facilities at their command. This Field Engineering Service is available, at no cost, through Square D branch offices in 50 principal U. S. and Canadian cities.



SQUARE D COMPANY

DETROIT

MILWAUKEE

LOS ANGELES

NEWS OF INDUSTRY

**Barium Steel Carries
On Negotiations For
Further Acquisition**

Canton, Ohio

• • • Since Barium Steel Corp. acquired the Clyde Iron Works, Inc., Duluth, Minn., owners of other properties in collateral lines have approached the company for the purpose of being absorbed either through purchase or by merger, according to J. A. Sisto, chairman, and Rudolph Eberstadt, president. Such negotiations are in progress and in line with the corporation's postwar plans to broaden its activities, it was said.

Barium's sales in 1944, less returns and allowances, amounted to \$3,125,376. Net income was shown at \$45,444. The net income of Clyde Iron Works, Inc., in 1944 amounted to \$238,238. Only four months of the Clyde income is shown in the Barium consolidated report.

Due to lack of skilled miners and the present high cost of production, Barium has decided to suspend operations of its Minerals Division. Whether operations will be resumed will largely depend upon subsequent developments of a more favorable nature, said the company's report.

Monarch Tool Co.

Sales Total Drops

Sidney, Ohio

• • • Shareholders of the Monarch Machine Tool Co., Sidney, Ohio, recently received the annual report showing gross sales of \$16,444,372 for the fiscal year ended Dec. 31, 1944, representing a decrease of 41.6 per cent from gross sales for 1943 which were \$28,159,595.

Net income for 1944, after provision for taxes and renegotiation of war contracts, amounted to \$708,216, equivalent to \$3.37 per share on the 210,000 shares outstanding. This compares with \$3.83 per share for 1943.

In his letter to shareholders, Wendell E. Whipp, president, pointed out that the company's production for 1944 included not only the manufacture of lathes, but also work on 30 war contracts for other products. Biggest of these contracts were for Bofors gun parts and for power take-off units for the Rolls-Royce Merlin aircraft engine. The work on gun parts will be completed by the end of the first quarter of 1945, Mr. Whipp said.

**R-S Furnaces
Speed War Production**



The design and construction of industrial heat treating furnaces involve the interlocking of metallurgical and mechanical principles. It is R-S policy to give every furnace problem the personal attention of our chief

engineer and his staff and to recommend the most efficient equipment consistent with sound economy.

Because of this personalized attention, R-S has been able to suggest changes in construction which have more adequately met industrial requirements and, in many cases, has made possible reduced costs, quicker delivery and the saving of quantities of critical materials.

R-S Industrial Furnaces are now doing important jobs for steel foundries, shipyards, aircraft and ordnance plants. In every case, contracts have been completed when specified, and have thus speeded the production of vital war products.

Check your heat treating requirements
with R-S Engineers now.

R-S Furnaces of Distinction

FURNACE DIVISION

R-S PRODUCTS CORPORATION

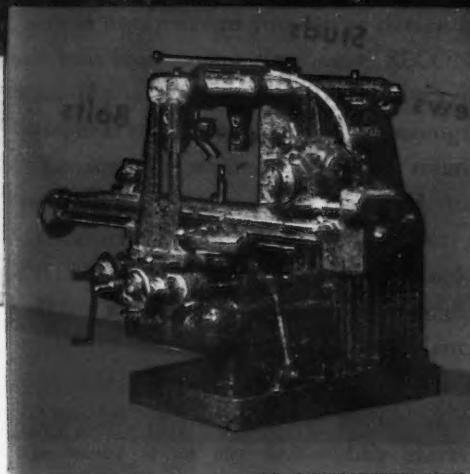
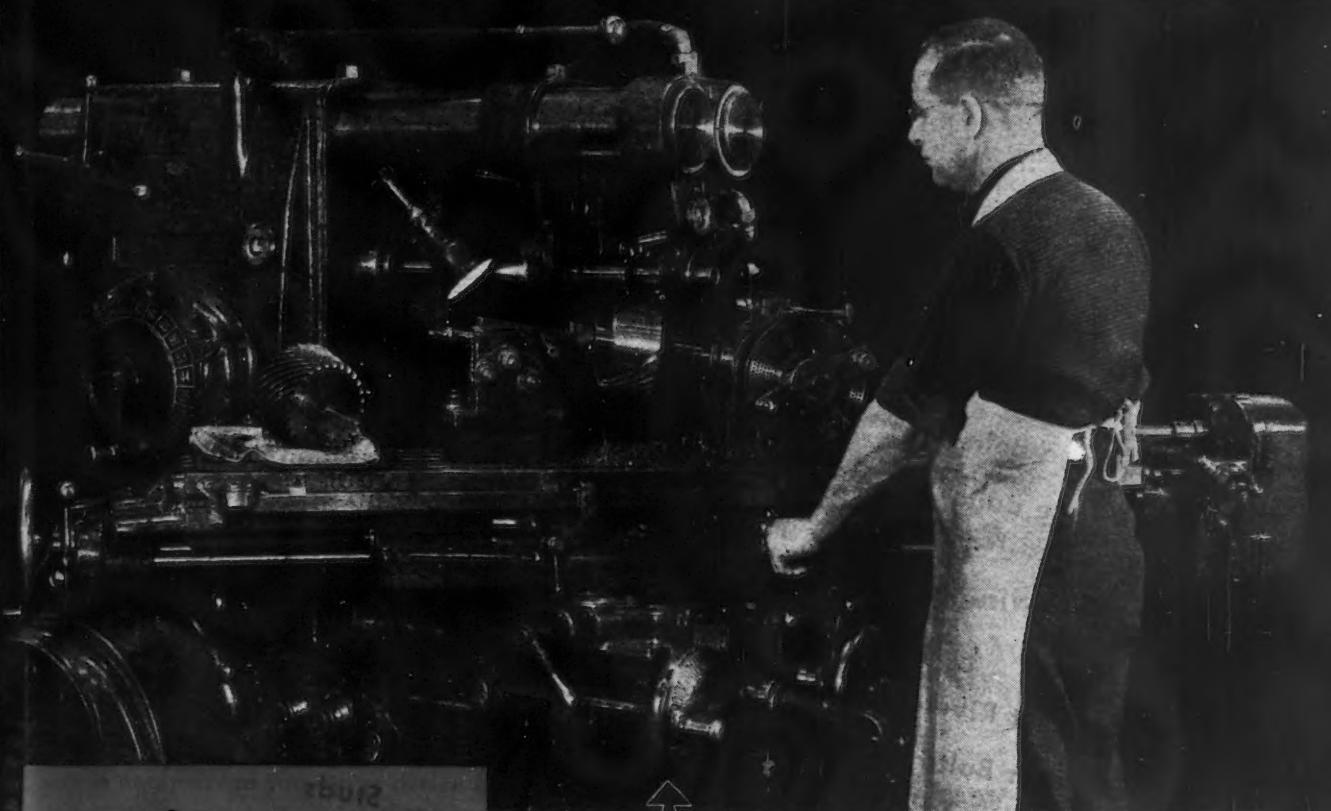
4524 Germantown Avenue • Philadelphia 44, Pa.

BUY WAR BONDS

PUT IT ON A

Milwaukee

TO MILL IT . . . WITH SPEED . . . PRECISION . . . PROFIT



Milling Taper Reamer: in this operation a Milwaukee 3K Universal is milling the flutes in a 20° included angle taper reamer. A low lead attachment is used with a Milwaukee Model K Dividing Head and tailstock for driving, holding, and indexing the workpiece. The space between each flute is measured by less than one turn of the 5 to 1 ratio Milwaukee Dividing Head. A Milwaukee Style B Arbor employing both intermediate and outer arbor supports is used to hold the form cutter.

"When the job is a bit tricky — play it safe — put it on a Milwaukee" — that's what experienced machine-shop men say. The range — power — precision of Milwaukee Milling Machines — their versatility in handling a wide variety of intricate "precision" milling operations with the least time and trouble — has made them the preferred machines wherever metal is milled.

Write for complete information on the Milwaukee line of more than 70 models of milling machines.



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CORPORATION**

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Milwaukee Machine Tools

If you want a bolt or screw..

ALL OF THESE PRODUCTS ARE STANDARD

Cap Screws	Lockwasher Screws	Sink Bolts
Carriage Bolts	Machine Bolts	Skein Bolts
Carriage Bolts— Ribbed Neck	Machine Screws	Spring Center Bolts
Clips—Wire Rope	Nuts— HP, CP, SF, Castle, Machine Screw, Lock or Slotted	Spring Clip Bolts
Cotters	Pipe Plugs	Step Bolts
Dardelet Rivet Bolts	Plow and Guard Bolts	Stove Bolts
Elevator Bolts	Rivets	Stove or Chair Rods— Headed and Threaded
Heel Bolts	Self-Tapping and Sheet Metal Screws	Studs
Hub and Wheel Bolts	Set Screws	Tire Bolts
Lag and Skein Bolts		Weather-Tight Bolts
Lockwashers		

Ask the draftsman, or design engineer, in a plant using bolts in assemblies, to name a few "standard" bolts and he may begin by naming "cap screws, lag screws, carriage bolts, machine bolts, and . . ."—then he is likely to stop to consider. Chances are, he has named all those with which he is familiar. But there are a great many more, as the long list of

quite common "standard" bolts listed in the panel above reveals.

For instance, only a farm implement manufacturer would know that there are several types of "plow bolts"—standard bolts with implement manufacturers for generations. Some of these bolts are surprisingly like other bolts not used by implement

THAT MEETS ALL REQUIREMENTS AND IS EASY TO GET . . . USE A "STANDARD" INSTEAD OF A "SPECIAL"

manufacturers, but by slight modification in dimensions and physicals serve other purposes.

Virtually all the bolts and screws used in the gigantic aircraft industry are almost exact replicas of existing bolts and screws used by other industries—excepting for materials of which they are made, more exacting fit and finish.

Frequently a customer designs a "special" bolt or fastening, assuming he cannot get or use a standard bolt. These "specials" require special dies, made of scarce die steels by even scarcer die-makers. Often critical materials are specified when less critical materials properly heat treated, would develop the required physicals. And all "specials" require special routing, handling and inspections throughout every step of their production.

Therefore we say, FIRST—find out from us if there is a standard bolt that may fit into your design. If there is not, perhaps you can re-design for a standard bolt now, saving time later. SECOND—determine if physicals can be met by less critical materials, heat treated to develop full strength. Lamson & Sessions maintains modern heat treating departments with chemical, physical and metallurgical laboratories manned by competent engineers. THIRD—if you cannot use a standard bolt, then call in a Lamson representative to discuss your problem. Out of his broad experience, he will probably be able to help you. And if you must have a "special" bolt tailored to your requirements, we can make it on our bolt-making machinery faster than any other way.

THE LAMSON & SESSIONS COMPANY, General Offices, Cleveland, O.
Plants at Cleveland and Kent, Ohio; Chicago and Birmingham



"BOLTS, NUTS & SCREWS"—1944 REVISION. Cloth bound. Limited edition, 180 pages of technical, practical information. Sent prepaid for \$1.00—cash or check must accompany your order.

"BOLTS ARE IMPORTANT!"—24-page booklet of currently useful information for buyers of headed and threaded products, and describing Lamson & Sessions' specialty fastenings which have wide industrial applications—now, and in the post-war period. Sent gratis.

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Send information on Cap Screws and Set Screws Cotters

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CP, HP, SF Nuts Lock-washer Screws Self-Tapping Screws

Name of Individual

Title or Kind of Work

Employed by (Name of Company)

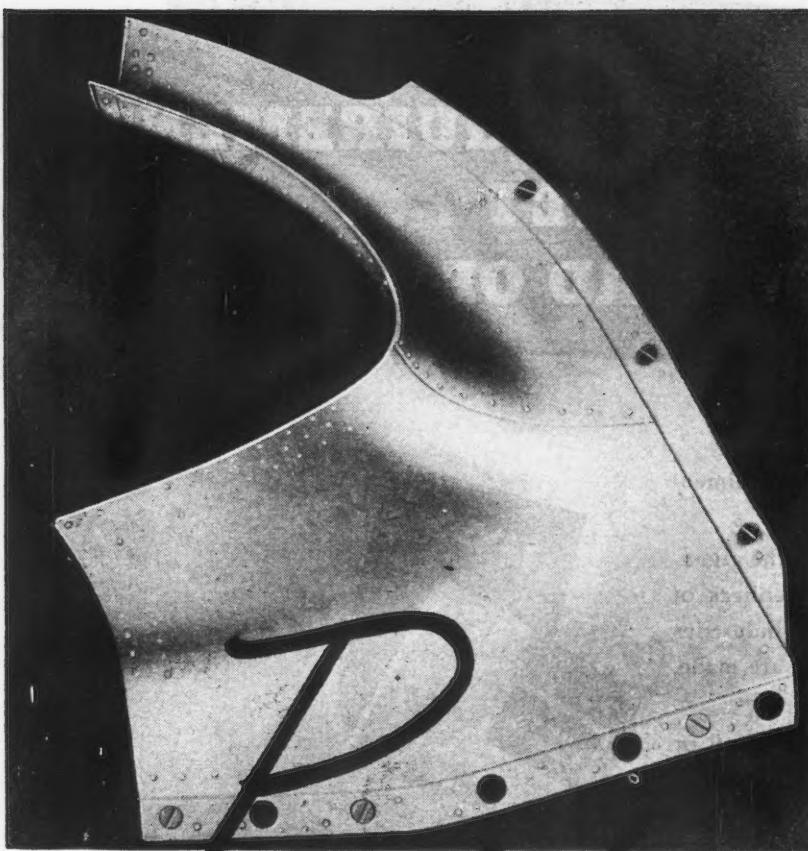
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Parish ALUMINUM STAMPINGS



Unimpaired metal structure and strength. No creases or wrinkles. Fidelity to design. Superior finish. Multiplied production speed. Minimum metal waste. Much lower costs. These are the results of producing even the most intricate modeled shapes on the great Parish battery of regular drawing presses. Parish complete service includes collaboration in the initial design stage; production; heat treating; and X-ray inspections of stampings; assembling including welding; painting or other finishing.

Use Parish facilities in part or their entirety for shapes and parts of aluminum or other metals.



MODERN DESIGN AT LOW COST

Parish Pressed Steel Co.

Subsidiary of SPICER MFG. CORP., READING, PA.

Western Representative: F. Somers Peterson, 57 California St., San Francisco, Calif.

NEWS OF INDUSTRY

while the power units will require 12 months or more to complete.

"Meanwhile, the demand for lathes, particularly for shell turning and for rocket manufacture, has grown by leaps and bounds. Monarch has also urgent orders from the Army, Navy and Maritime Commission for turning machines with which to build jet propulsion aircraft and vital Ordnance and Signal Corps equipment, and looking to the future, Mr. Whipp said, "there has been much talk about the great overproduction of lathes and other machine tools for war, with a consequent destruction of the peace-time market for years to come. A logical appraisal discounts much of this kind of thinking. The jobs of war are rugged ones. Machine tools operating 24 hours a day, 7 days a week and in inexperienced hands are aging many times faster than normally and a good many will have to be replaced completely by the time victory has been won. At the same time, a greater appreciation and dependence on things mechanical has come out of the war to date and will create a demand for a larger number of machine tools in the future."

Canadian Implements To Suffer From Steel Cuts

Toronto

• • • Following the announcement from Washington to the effect that because of tightness of steel and other critical materials, there will be a 50 per cent slash in production schedules right across the board for the 12 months' production period commencing July 12 next as announced to Canadian officials, it now appears that there will be a sharp cut in production of agricultural implements in Canada for the coming year.

If put into effect, this would mean that Canadian domestic production would be reduced from about 156,000 tons of implements in the present year to 92,600 tons in the 1945-46 period. It also would mean a 50 per cent cut in imports of finished implements from the United States. However, as the proposed new production schedules do not start until July 1, 1945, the cut-back announced by Washington may be governed by the progress of the European war. It is stated that on the present basis, Canadian plants will only receive a fraction of their present materials during April, May and June and may become more serious as the year advances.

ANNEAL Stainless* FASTER



in SALT BATHS

MINUTES . . . INSTEAD OF HOURS!
1 SALT BATH . . . INSTEAD OF 6 CONVENTIONAL FURNACES!
LESS LABOR . . . LESS FLOOR-SPACE . . . LESS COST!

That's modern salt bath heat treatment in a nutshell.

***Stainless**
WIRE
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RODS
FORGINGS
CASTINGS
TUBES

A complete battery of production-type salt bath furnaces and the services of a competent metallurgical staff are available for heat treating specimen work. No obligations entailed.

Specifically (referring to photos above): This well known producer increased his shipments of stainless steel wire 25% following installation of an Ajax Salt Bath Furnace for process annealing (1850° F.) and final annealing (1925°—1950° F.). Uniformly excellent results are achieved on 30 different alloy analyses and in all sizes down to 30 gage and less. Only 15 to 30 minutes immersion is required for the average charge. Production for 8 hours with the single Ajax furnace is equivalent to 24 hours operation of 6 atmosphere-type strand annealers previously used. Final cost per pound is substantially below previous cost.

It's the principle of the thing that makes this astounding difference . . . the Ajax principle. The bath is internally heated by closely-spaced electrodes which create an electromagnetic stirring action, thus holding temperature variations throughout the bath within 5° F. Faster heating cycles are made possible since heat is immediately transferred to the work by intimate contact thru immersion in the bath . . . conduction rather than radiation. And, as for atmosphere control . . . it's simple: salt baths control atmosphere by eliminating it! Further, the work is protected after removal from the bath by a thin film of salt which covers the surfaces. Ajax salt bath annealing of stainless steels adds up to these tangible advantages over conventional methods: Lower initial cost because less equipment is required; Lower production cost per pound of work annealed; Drastically less floor-space; Faster annealing cycles. Investigate modern salt bath heat treatment as applied by Ajax . . . batch type or completely conveyorized units can be supplied in any size to meet production requirements for all key heat treat processes in the temperature range of 300°—2400° F. Request Catalog 107C.

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Ajax Electric Furnace Corporation

Ajax Engineering Corporation

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**It's a Cinch to Buy
Blades This Way**



You don't buy a "pig in a poke" when you select a blade from this open-face STAR display. Blade withdrawal is "finger-tip" operation. Just slip a blade out through the top of the open box, and satisfy yourself that STAR blades are the blades you want for the type of work you are doing. The STAR Unbreakable Special Flexible Blade is the all-around blade for the expert mechanic.

KNOW-HOW BOOKLET
Use the coupon to send for copy of
"Metal Cutting"—a miniature textbook on selection, care and use of
hack saw blades and frames.

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Please send me a copy of your booklet "Metal Cutting".	
Name _____	Address _____
Kind of work _____	

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Versatile LST Now Modified For Beachhead Aviation Repair Tasks

Ambridge, Pa.

• • • The versatile LST, aptly dubbed the "workhorse of the Navy," soon will be put to another important use. Beachhead aviation repairs is the assignment for these craft, it was disclosed recently, on the eve of the launching of the U. S. S. *Aventinus*, first of a new-type Navy ARV—Auxiliary Repair Vessel (Aircraft)—at U. S. Steel's American Bridge Co. shipyard.

Base shops afloat aren't new, but this is the first LST-hulled ARV.

Long planned and carefully designed by Navy shipbuilding experts, the *Aventinus* is headed for important duty overseas. She will afford an immediate repair base for aircraft on newly-captured beaches, teaming up with the steel landing mat in the job of converting former enemy-held land to quick use by American planes.

Delays in building and equipping repair shops near the new air landing strips will be averted. The ARV will be nearby to meet the requirement.

Outwardly, the ARV is little-changed in appearance from the LST. She has the same bow doors that swing open and the ramp that is lowered to permit speedy access of mechanized equipment and troops. But inside the ARV will be entirely different. She will have an overhead crane that moves the length of the big compartment in which the LST carried her tanks. This main compartment will house drilling machines, lathes, and countless other equipment for servicing aircraft. Hatches opening from the central room will connect with auxiliary shops which will be equipped with woodworking, sandblasting, electrical, and other devices. The ship will have an air-conditioned paint shop.

Chesapeake and Ohio Asks Permission to Build Engines

Cleveland

• • • The Chesapeake and Ohio Railway recently asked WPB permission to build three coal-burning locomotives of a type designed to use in combination steam, turbine and electric drive.

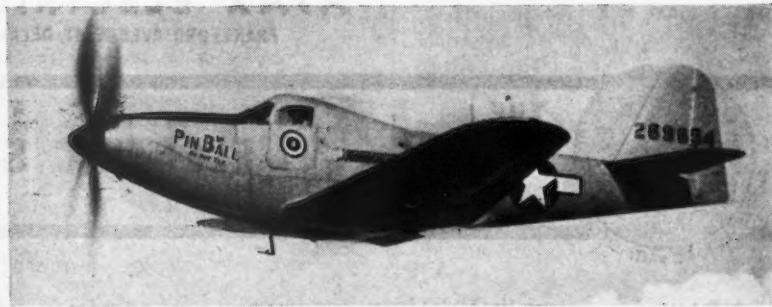
No electrically driven locomotive powered by steam turbine is in operation on any railroad in this country today. Each of these locomotives are designed to combine in a single unit the advantages of speed, continuous power and smoothness of operation that, with other types of fuel and

comparable horsepower, have heretofore been achieved only in multiple units.

This locomotive will develop 6000 horse power, delivered from a turbine to generators for the electric motors which drive the wheels. It will be capable of running more than 100 miles an hour under full load, with high sustained speeds even on grades, according to the company.

Baldwin already has completed the basic designs and will build the new motive power in cooperation with C&O mechanical officers, while the steam turbine and electrical equipment, required by C&O as integral features, are designed and will be built by Westinghouse.

PIN BALL: Fire at it. Hit it. Nose light goes on. Hence the name applied by the group who developed this first target RP-63 plane to be fired at with frangible bullets (colloidal lead and phenolic resin.) The No. 2 plane was named "Frangible Sal," after the Bell Aircraft project engineer who headed the project for the company.





Umbrellas are not always for weather protection. To the Navy the "umbrella" is the protecting layer of five-inch anti-aircraft gun fire during enemy attacks, an "umbrella" that keeps heavy bombers high and ineffective.

Bases, carriages and slides for these remarkably accurate Navy guns, welded and machined at Danly, are mounted on Navy ships throughout the world . . . important proof of the value of precision welded steel fabrication.

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The RIGHT Wire
for your Purpose

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PAGE can answer such questions for you. And, in answering them, PAGE may show you how to simplify, economize or speed up your production. For PAGE experience includes the use of wire in the making of other products—as well as the manufacture of practically any kind of wire.

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PAGE offers a wide range of electrodes for welding iron, carbon steels and the various analyses of Stainless.

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NEWS OF INDUSTRY

AFA Awards Associates For Outstanding Work In Cast Metals Field

Chicago

• • • Awards for distinctive contributions in the field of cast metals have been announced for 1945 by the Board of Awards of the American Foundrymen's Association. Robert E. Kennedy, AFA secretary, will receive the Joseph S. Seaman gold medal for "outstanding meritorious service to all branches of the foundry industry through his work in organizing and guiding the development of technical and operating papers and discussions, and his untiring encouragement to all AFA chapters, committees, and members." C. E. Sims, supervising metallurgist, Battelle Memorial Institute, is to be the recipient of the John A. Penton gold medal "because of his outstanding contribution to the steel casting industry."

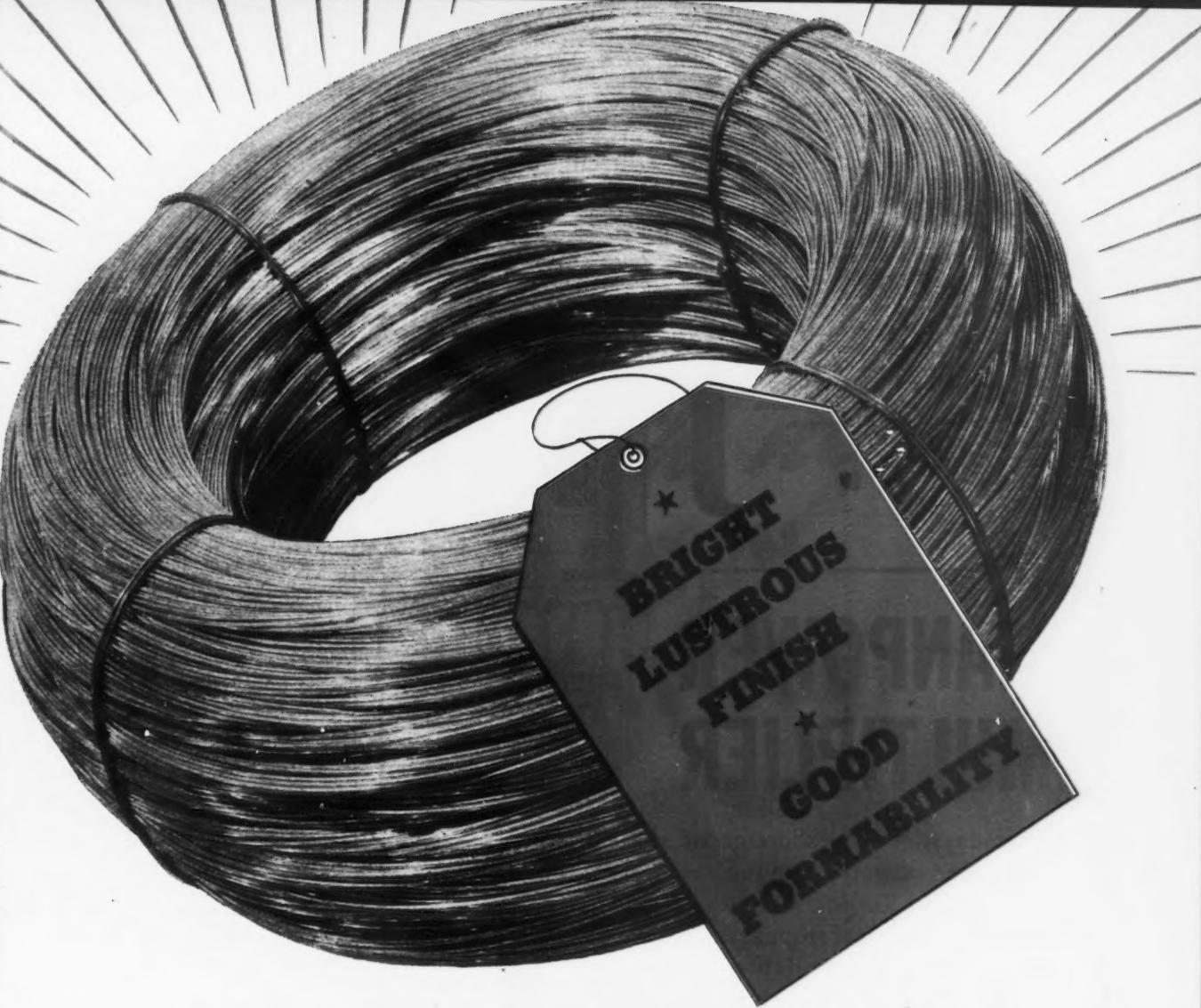
Life memberships were voted to M. J. Gregory, formerly factory manager, Foundry Division, Caterpillar Tractor Co. and now retired, "for his contribution to the association and the foundry industry;" to Rear Admiral A. H. Van Keuren, U.S.N., director, Naval Research Laboratory, Anacostia, D. C., "in recognition of his efforts in behalf of the foundry industry;" to Ralph J. Teetor, president, Cadillac Malleable Iron Co., Cadillac, Mich., and AFA president 1944-45; and to R. E. Kennedy and C. E. Sims, 1945 medalists.

Mr. Kennedy has been identified with the AFA staff since 1924, when he was appointed assistant secretary. In 1925 he was elected technical secretary, and in 1938, secretary. A graduate of the University of Illinois, where he spent a number of years as instructor and later as assistant professor in charge of foundry practice, his long record in the foundry industry also includes considerable practical experience in foundry work.

Mr. Sims, after a successful record in industry, assumed his present position with Battelle Memorial Institute in 1937. He has been active in the technical work of AFA, and has contributed many valuable articles to the trade press.

M. J. Gregory was active in industry as factory manager of the Foundry Division, Caterpillar Tractor Co. and is a past director of AFA.

Admiral Van Keuren is a former assistant chief and chief of the Bureau of Ships. Since November 1942



NEW CONTINENTAL *kokote* WIRE

● An entirely different kind of galvanized steel wire is Continental's new KOKOTE. You have to see it to believe a galvanized coating can be so silvery bright and lustrous. New KOKOTE is produced by a special Continental process. It has a desirable degree of stiffness. Made in sizes from 18 to 28 gauge to adapt it to a wide range of applications. The wire is carefully selected open hearth steel produced in Continental's own furnaces. Furnished in coils, and on spools and paper cores. You are invited to write, describe your wire requirements, and receive a sample of new KOKOTE.



CONTINENTAL STEEL CORPORATION

GENERAL OFFICES • KOKOMO, INDIANA

PRODUCERS OF:

MANUFACTURER'S WIRE: Bright, Annealed, Galvanized, Coppered, Tinned, Liquor Finished, Lead Coated, Special wire, etc. Also Chain Link Fence, Nails, etc.

THE SUPERIOR SHEET STEEL COMPANY, DIVISION • CANTON, OHIO

STEEL SHEETS: Black, Galvanized, Hot Rolled Annealed, Hot Rolled Pickled, Long Terne, Copperior, Lead-Sealed, Galvannealed, Super-Metal, etc.

NEWS OF INDUSTRY

he has directed the Navy research laboratory at Anacostia, and the freedom with which the laboratory's development and test work on cast metals has been made available to private enterprise, is attributed in large part to his directorship.

Oil Tubular Goods Prices To Cover Costs of Trucking

Washington

• • • To become effective April 2 OPA has authorized holders of excess stocks of oil country tubular goods to include in their selling prices to users the transportation charge the holder paid or would have paid a commercial trucking company for hauling the goods from the railroad siding to the place where the stock is held. Previously the holder of oil country tubing casing, drill pipe or drive pipe was required to absorb the transportation charges from the nearest railroad siding to his place of storage when the material was sold to customers. OPA said that the hauling charge may be included in the selling price to a consumer only when the material is resold substantially the same as received. A "holder" of excess stocks of oil country tubular goods is defined as a person who has acquired oil country tubing or pipe for his own use or for any purpose other than resale. OPA said that the fact that oil companies have heretofore had to absorb trucking charges from railroad siding to their places of storage in resale of excess stocks of material tended to retard sales.

25,000 Fans Allowed

Washington

• • • WPB representatives told the Domestic and Commercial Electric Fan Industry Committee at a recent meeting that approximately 100 percent of the steel, aluminum, and copper needed to make 25,000 propeller-type electric fans will be available in the second quarter of 1945 allotment to manufacturers, but allotments will be made only to the extent that manpower and facilities are available. Some curtailment of the supply of material, however, may be expected in the third quarter, it was stated. Under present conditions, officials said, no new electric fans will be available for home or office use in 1945. It was pointed out that all the fans to be authorized for production under the approved quarterly program are needed for essential military, hospital, and industrial purposes.

VELVET-SMOOTH CONTROL!

No. 50 easily handles many jobs previously considered too delicate for a power driver. The patented, new principle "Adjustomatic" clutch delivers any desired torque. Adjustability is so sensitive that screws from No. 10 down to No. 2 and smaller may be driven with a uniformity that eliminates breakage and marring of surfaces. Instant, effortless control assures quick, positive positioning and minimum fatigue.

MANPOWER MULTIPLIER

Nowadays, with a shortage of skilled manpower, power-driven tools must take up the slack. To do this, with no "time out" for mechanical stoppages, they must be unfailingly dependable — like this Millers Falls No. 50 Electric Screw Driver.

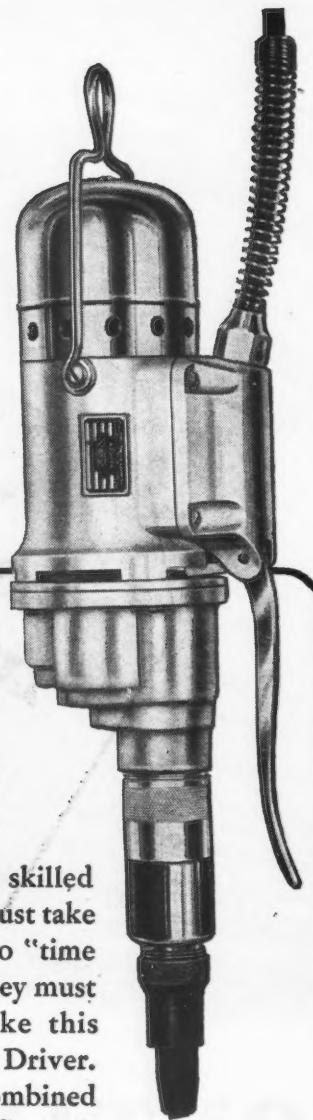
Many exclusive refinements, combined with the sturdy power unit and precision transmission, make No. 50 the most versatile, dependable electric driver ever built — a consistent top-notch performer for speedy, accurate mass fastening.

You can step up manpower effectiveness, and cut production time and costs with Millers Falls No. 50. It is a worthy member of a complete line of electric production tools. See your distributor, or let us survey your assemblies and make recommendations.

ONE THING IN COMMON—QUALITY

MILLERS FALLS
TOOLS
SINCE
1868

MILLERS FALLS COMPANY
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Stop RUST losses with new **WAR-BORN PREVENTIVES**

RUST—a nuisance and a very costly menace in many plants no longer need be tolerated. Laboratory magic has furnished its master.

New Sinclair products, developed to solve tremendous military rust problems, are now available for your plant problem.

Sinclair **RUST-O-LENE B** for exposed metal surfaces of machinery in operation, in storage, or in transit

- provides a firmly-adhering rust proofing film
- prevents rusting of clean surfaces
- halts further rusting of corroded surfaces
- has lubricating qualities
- defies any degree of moisture from mere dampness to heavy rain
- can be readily removed when desired

Sinclair **OPALINE RP** (Rust Preventing) OILS for enclosed oil systems, prevent internal rusting of engines, hydraulic systems, gear reducers, and similar machinery intermittently operated, stored, or transported. OPALINE RP also has ample lubricating qualities for temporary use.

Both these remarkable Sinclair rust-preventives have successfully passed the most exacting service tests, and fully meet Government specifications.

Learn how **RUST-O-LENE B** and **OPALINE RP** can combat rust for you. Write for brochure giving full details.

SINCLAIR INDUSTRIAL OILS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N.Y.

Rust-O-Lene-Opaline Reg. U. S. Pat. Off.

THE IRON AGE, April 12, 1945—129

NEWS OF INDUSTRY

WPB Reports Contract Awards \$22 Billion In Four-State Region

Cleveland

• • • Prime contract and facility awards in this four-state region since the beginning of the war have amounted to \$22,346,808,000, the War Production Board announced recently.

Supply and facility awards by states since early 1940 have reached these totals: Ohio, \$16,383,625,000; Pennsylvania, \$13,352,592,000 (only the western half of the state is included in the Cleveland region); Kentucky, \$1,163,938,000, and West Virginia, \$960,227,000. Contract awards cover aircraft, ships, ordnance and other requirements and military and industrial facility projects.

By industrial areas, the distribution of the major war supply contracts and facility projects has been:

Akron, \$1,970,637,000; Canton, \$447,544,000; Charleston, W. Va., \$282,409,000; Cincinnati, \$2,418,511,000; Cleveland, \$4,834,265,000; Columbus, \$953,068,000; Cumberland, Md., \$139,876,000; Dayton, \$1,603,369,000; Erie, \$422,382,000; Lima, \$329,268,000; Louisville, \$1,358,708,000; Mansfield, \$170,419,000; Marion, \$214,795,000; Pittsburgh, \$2,631,338,000; Wheeling, \$422,027,000; Youngstown, \$1,134,717,000; and the remainder of the region, \$3,013,475,000.

Steel Shipping Container Men Ask Additional Sheet

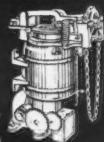
Washington

• • • The Steel Shipping Container Industry Advisory Committee has recommended to WPB that the industry be given sufficient steel for a 60 days inventory to facilitate the production of the various sizes and types of steel containers required for military and industrial use.

This recommendation was made at a recent meeting at which it was disclosed that the critical shortage of sheet steel has resulted in a reduction of allotments for steel drums and shipping pails. WPB officials said that this reduction, together with increasing military requirements for steel packaging, will be reflected in a reduced supply of drums and pails for industrial use during the next few months.

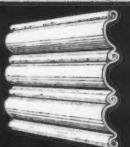
Packers were urged by the container industry and WPB to expand their efforts to reuse drums and pails. Consumers were requested to assist in

MOTOR OPERATOR



SAVES LABOR

FLEXIBLE STEEL SLATS



SAVES MAINTENANCE

REMOTE CONTROL



SAVES TIME

No time or effort is wasted in opening (or closing) the Kinnear Motor Operated Door. Just a touch on the control button and the sturdy motor operator goes instantly into action, coiling the flexible steel slat curtain up, out of the way, and clearing the opening completely. Floor and wall space can be utilized to within a few inches of the door.

The Kinnear Motor Operator, featuring a specially designed torque output motor, machine cut gears and bronze bearings is built into an integral unit of exceptionally long life and durability. Remote control switches can be installed at convenient points to save additional steps and time. The flexible steel slats of the curtain are strong and rugged, and are built to withstand years of continuous use.

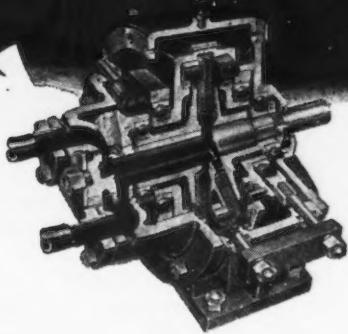
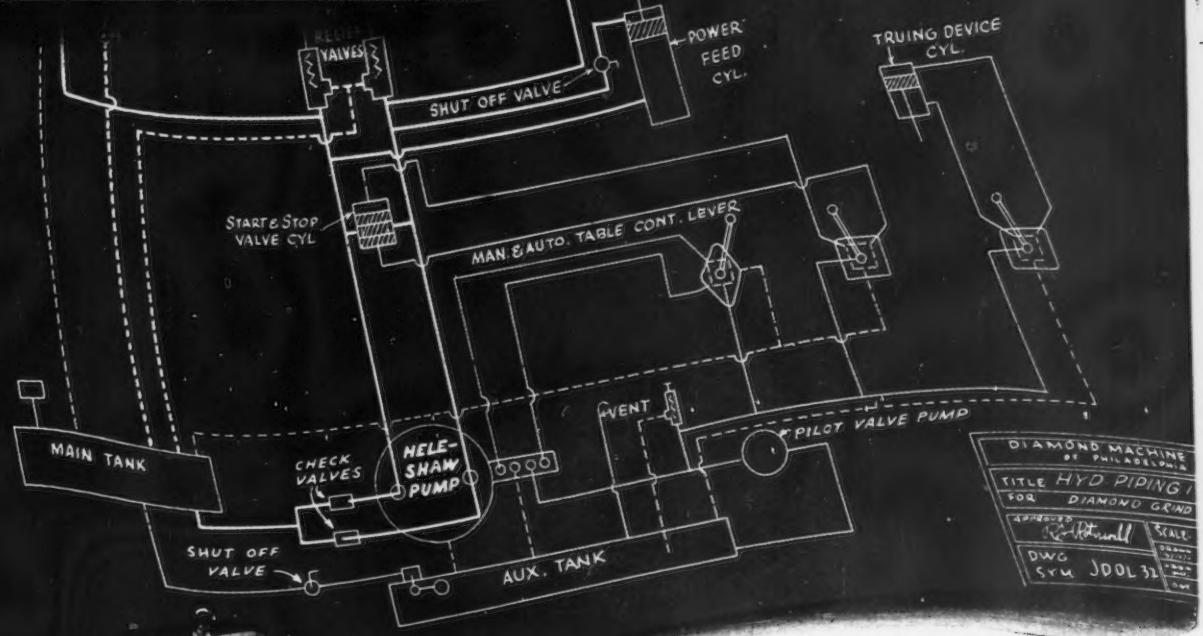
These and many other Kinnear advantages add up to make the Kinnear Motor Operated Door a good investment. Plan to cut your door costs with the door that has proven its dependability . . . in many cases serving continuously for over 40 years.

Kinnear Doors fit openings of any size and are built to your individual needs. Write now to the Kinnear Manufacturing Company. Factories: 1760-80 Fields Avenue, Columbus 16, Ohio; 1742 Yosemite Avenue, San Francisco 24, California.

SAVING WAYS IN DOORWAYS

KINNEAR
ROLLING DOORS

**How to Stop
A BULL'S RUSH
with a Baby's Kiss**



THE HELE-SHAW

Fluid Power
PUMP

OTHER AE PRODUCTS:

A-TAYLOR AND PERFECT SPREAD STOKERS,
MARINE DECK AUXILIARIES, LO-HED HOISTS
DIAMOND FACE GRINDERS

A Reversal Problem Solved by Hele-Shaw Fluid Power

It is no easy job to stop the mad rush of a face grinder table racing at speeds up to 100 F. P. M. and reverse direction in the wink of an eye. But it is done by driving the table through hydraulic pistons powered by a variable stroke, reversible Hele-Shaw Pump.

Hele-Shaw Fluid Power drives the table at a speed which is uniform but may be varied. It also cushions the impact down to a baby's kiss at the end of each stroke.

Learn the multiple advantages of Hele-Shaw Fluid Power today for your operations. Write for the help of application-wise Hele-Shaw engineers.



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NEWS OF INDUSTRY

Fast, low-cost load-handling where your other material-handlers don't reach...

ROUSTABOUT CRANE

The Free-roving, Tractor-footed Load-hustler of a hundred uses



If it pays you to have overhead cranes, conveyors or factory trucks, you'll find your versatile Roustabout Crane highly profitable outside their range — for moving, loading, stacking heavy stuff all around your plant. Instant action where needed — no crews taken from other work. Smooth easy operation — picks up a 7½ ton machine or sets down a crate of eggs safely. Built for years of over-work — ball-bearing boom turntable, gears in oil. Hundreds of plants regard their Roustabouts as indispensable. Write for the facts about this fast-action wheel or crawler crane.

Roustabout saves you time and money on these and many other jobs

- Big stuff off and on trucks, freight cars
- Moving large machines
- Handling bales, boxes, drums
- Moving big castings, motors, railroad and marine gear
- Loading air transport planes
- Handling tanks, pipe, structural steel
- Installing heavy valves and fittings

THE HUGHES-KEENAN COMPANY
571 Newman Street, Mansfield, Ohio

Roustabout Cranes

By Hughes-Keenan

Load-Handling Specialists Since 1904



alleviating the shortage by returning empty steel containers promptly to their suppliers. When return to the original packer is impractical, containers should be made available to used drum dealer reconditioners or another user in order that they may be returned to essential trade channels without delay.

In response to a request by government officials to increase small container production to meet present large backlog of orders, several industry committee members voiced the opinion that they could improve their output if sufficient boxcars were made available. A few shut downs were reported as a result of manufacturers inability to obtain boxcars.

Civilian Employment Drops to 52 Million

New York

* * * Civilian employment in the United States last year receded more than a million from the peak average of 53,097,000 in 1943, although total employment reached a new record of 63,072,000, as the armed services and civilian government employment continued to expand, according to the National Industrial Conference Board.

Civilian employment in January of this year was about one and one-half million below that of January 1944, according to the board's preliminary estimate, but there was little change from December in the number of wage earners in the munitions industries.

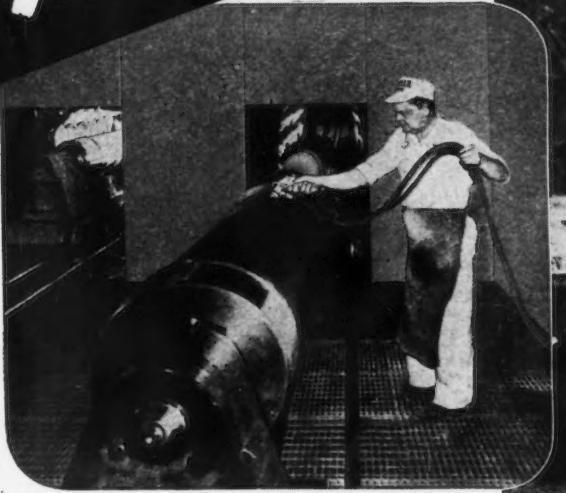
Significant declines were found for 1944 in all major industrial job groups except transportation, where there was an increase of almost half a million. Manufacturing lost 759,000 workers from the average of 1943, while other declines were: Agriculture, 234,000; forestry and fishing, 15,000; mineral extraction, 60,000; construction, 412,000; and public utilities, 54,000. The total industrial decline from 1943 to 1944 was 826,000.

Employment in mining was the lowest in this century, and there were fewer workers in agriculture than in any year since 1901.

Transportation engaged 2,934,000 workers, the largest number on record, and there were slight increases in employment in trade, distribution and finance, and in the group of miscellaneous industries and services.

The increase of average total employment by more than a million in 1944 was accounted for largely by a jump of 2,077,000 in the figure for the service industries, a classification

*There she goes
11 MILES UP!*



Signal Corps Photo

THE earth seems to shake. Night becomes day-bright. From the mouth of the gun a shell flies up, up, 11 miles up... almost four miles higher than any plane can reach!

Miracle gun? You said it! And, fortunately, one of our guns. For this 4.7 "stratosphere gun" was designed by engineers of the U. S. Army. The highest-firing anti-aircraft weapon on record, it can also be depressed to scourge the enemy anywhere on land. Equipped with automatic fuse setter, it can be fired rapidly from any angle by remote control.

At Milwaukee's Chain Belt Company, giant tube and breech blocks for this amazing weapon had to be turned out fast to meet Uncle Sam's demands. And that explains why Chain Belt used high-speed DeVilbiss Spray Equipment exclusively for the

protective painting of these important parts.

Today, where speed and quality are desired in painting and coating work, industry looks to DeVilbiss for the maximum of each. For DeVilbiss spray equipment, exhaust systems, air compressors, hose and connections comprise four complete lines of quality products designed to *work together* to provide the best spray system for every requirement. Consult a DeVilbiss spray engineer first!

THE DEVILBISS COMPANY, TOLEDO 1, OHIO

Canadian Plant: Windsor, Ontario



DEVILBISS
Spray Systems

SPRAY EQUIPMENT • EXHAUST SYSTEMS • AIR COMPRESSORS • HOSE & CONNECTIONS

70 YEARS OF PROGRESS

...pioneering NEW IDEALS

SINCE its inception in 1875, this unique organization of metalworking specialists has pioneered in the development of new ideals of quality and craftsmanship. GRAMMES has paced progress by its leadership . . . in the continuous research of metals and materials, development of special decorating processes, and by its constant expansion of services and facilities.

PREWAR It has been the privilege of GRAMMES to serve the Automotive, Aviation, Refrigeration, Radio, Electrical, Toy, Giftware and other key industries as Contract Manufacturer.

WARTIME GRAMMES continues to produce 100% for Victory . . . twice honored with Army and Navy "E" awards.

POSTWAR Newly developed production techniques and increased facilities will be available to industry . . . pioneering new ideals that represent progress. Services available include . . . stamping, drawing, spinning, etching, embossing, lithographing, enameling, French-fired enameling, plating, spraying, wire forming, drilling, welding, machining, heat treating, anodizing (alumilite), tools & dies and line assembly. Engineering and Design staff available NOW for product development.

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More Than a
Billion Pieces
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NEWS OF INDUSTRY

which includes the armed forces and government employees.

Government civilian employment includes the federal executive, legislative and judicial services, government corporations and estimated employment of state and local governments, but excludes federal employees outside continental United States, employees of private firms engaged in Federal Government construction, and fourth-class postmasters. The average for 1944 was 5.9 million persons.

Peak government civilian employment of 6.1 million was reached in December 1944, an increase of 49 per cent from that of December 1939.

Including the armed forces, government employment in December 1944, totaled 17.6 million, or 28 per cent of total employment.

Warns Exporters Not To Be Overoptimistic On Trade With India

New York

• • • Warning that it would be "unrealistic" for American exporters of products not essential to India's industrial development to indulge in extravagant ideas about the market, Clayton Lane, director of war economic relations with the American mission at New Delhi, told the New York Board of Trade, International Section, recently that the country's sterling balances will eventually channel a great part of India's trade back to Britain.

"It would also be unwise to conclude that the Indian market will shortly after the end of the war present great opportunities for a multitude of American products," he said.

"It seems to me very likely that any government at New Delhi will be under enormous popular pressure, for decades to come, to minimize imports of anything that can be made in India or which would diminish the foreign exchange available for importing machinery and materials for the manufacture in India of anything."

"Any government, whether its officials are British or Indian, may be expected to adhere in both principle and practice to very tight import controls as an unavoidable aspect of the economic planning which has as its major objectives expansion of industry and rehabilitation of agriculture. It may nevertheless be expected that both official and private planners and importers will use every cent of

Why They Say—
**"IT'S OUR BEST BUY IN
 BRUSHES"**

NEOCETA



1 HOLDS MORE

Each Neoceta bristle is channeled to hold more paint. High carrying capacity. Fewer dips. Less fatigue.

2 SPREADS BETTER

Neoceta bristles brush out well. Carry and spread paint evenly over maximum area. Not limp. Not too stiff.

3 WORKS EASIER

High capacity—perfect balance plus fewer dips—less effort. Light stroke—little brushing.

4 FINER FILM

Perfectly tapered Neoceta bristles lay paint smoothly.

5 LONG LIFE

Neoceta stands up under hard service. May be used in all oil, casein and water paints, varnish base enamels, varnishes and shellac. Clean easily.

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 SCIENTIFIC BRISTLE FOR
 A BETTER PAINT BRUSH*

WORTHY COMPANION OF THE FAMOUS *Gold Stripe* BRUSHES



**PITTSBURGH
 PLATE GLASS COMPANY**

Brush Division

REPRESENTATIVE LINE OF NEOCETA BRUSHES NOW AVAILABLE · SEE YOUR NEAREST "PITTSBURGH" BRANCH

You can rock or swivel . . . with FORD TRIBLOCS



Frequently it is necessary to turn or twist a load into position. **FORD TRIBLOC** hook assemblies permit swiveling. Occasionally it is necessary to rock or tip a load into place. **FORD TRIBLOC** hook assemblies allow for rocking. . . . Just one of the many features which make **FORD TRIBLOCS** preferred everywhere.

FORD TRIBLOCS are ideal for constant hard usage. Spur gear construction, ball-bearing load wheels, both high tensile strength and elasticity in load chain, and many other features assure enduring efficiency. Capacities: $\frac{1}{4}$ to 40 tons.

FORD SCREW GEAR HOISTS are used where smoothness in lifting and lowering of loads is desirable and where portability is essential. Lightweight: highly portable. Capacities: $\frac{1}{2}$ to 10 tons.

FORD DIFFERENTIAL HOISTS are constructed for light service where speed, portability and price count. Capacities: $\frac{1}{4}$ to 2 tons.

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ACCO



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Portland, San Francisco, Bridgeport, Conn.

**FORD CHAIN BLOCK DIVISION
AMERICAN CHAIN & CABLE**

In Business for Your Safety

NEWS OF INDUSTRY

dollar exchange they can get to buy American products and advice."

Mr. Lane, who recently returned from a four-year tour of duty in India, explained that as the flow of lend-lease diminishes, India will obtain "as much as possible, of what must be imported" from the United Kingdom. The large sterling credits India has accumulated in London represent a major portion of the country's purchasing power, he pointed out.

Turning to the question of industrialization, Mr. Lane stated that "India is now being hustled to a rather startling degree, on paper." One of the chief problems he indicated, is the integration of the many plans into a system of priorities—a system which will be aimed at allocating all the dollar exchange available for production goods and essential consumption goods.

In the industrialization of that country, Mr. Lane reported there is an "aversion" to the participation of American capital.

"They'll want advice and want to pay for our know-how, but they have an aversion to capital penetration which they fear frequently leads to political penetration," he said.

du Pont Reports Rise In 1944 Sales Volume

Wilmington, Del.

• • • Net earnings of E. I. du Pont de Nemours & Co. in 1944 amounted to \$6.60 per share of common stock, as against \$5.59 in 1943. Net income in 1944 was \$80,870,160.

Sales to customers, including the government, in 1944 were \$622,062,712, up 6 per cent over 1943. In addition, war materials valued at \$218,413,000 were produced by the company in government-owned plants; products manufactured for other companies amounted to \$53,835,000, and interdepartmental billings for the year were \$67,906,000.

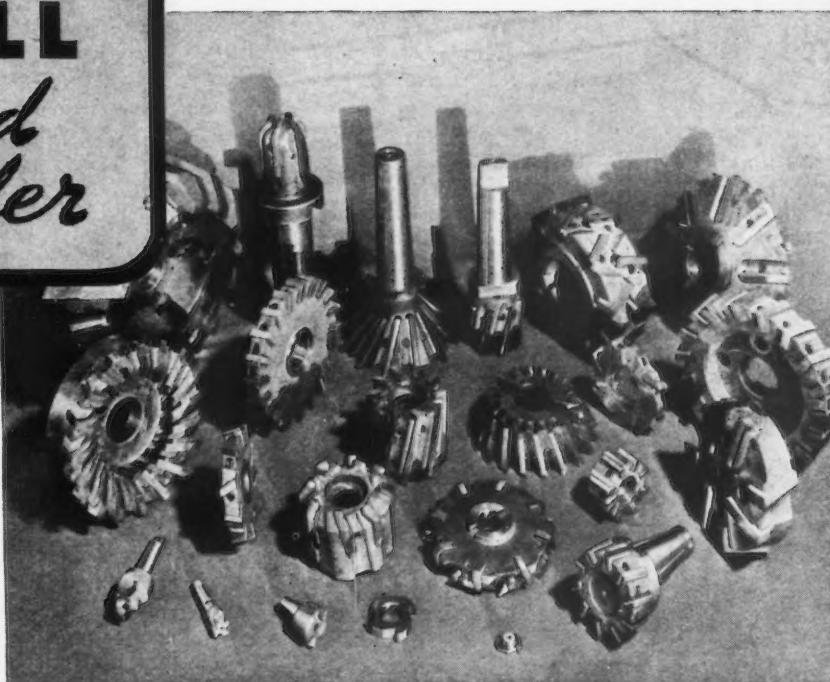
Over the five-year period the costs of the principal raw materials purchased by the company advanced 46 per cent and hourly wages 42 per cent. Lower prices for the company's products during this period were made possible by "progressive improvements in manufacturing processes, large volume of production, and employment of additional capital."

Export sales approximated 8 per cent of the company's total sales in 1944 compared with approximately 6 per cent the previous year.

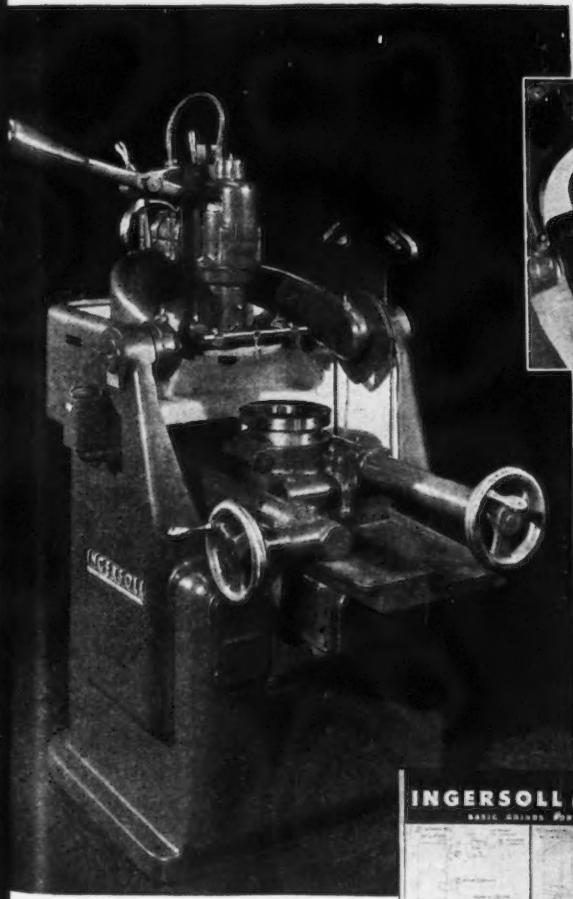
INGERSOLL

Cutters and Cutter Grinder

Ingersoll specializes in the design and manufacture of inserted blade milling and boring tools for use on all makes of milling and boring machines. A wide variety of standard types and designs of face mills, half side mills, staggered tooth slotting, helical slab and end mills cover most milling and boring applications. Modifications of these standard designs and special cutters are made to suit the unusual conditions. Cutters are furnished with high speed steel, cast alloy, or carbide tipped blades.



Write for cutter catalog describing complete line of standard inserted blade cutters.



CONVENTIONAL FACE MILL



INGERSOLL SHEAR CLEAR



DOUBLE ANGULAR CUTTERS

To obtain best results with your milling cutters it is essential that they be properly ground. The Ingersoll cutter grinder is particularly designed for grinding face milling cutters at a single setting from 4" to 30" in diameter with maximum peripheral face of 7". It will also grind solid shank, radius, staggered tooth, and angular inserted blade cutters. It is fast, accurate, and may be operated by the average mechanic.



The attractive 15" x 23" grinding chart gives basic grinds for standard milling cutters. These charts are suitable for mounting in a conspicuous place in tool rooms and are available for free distribution on request.

Write for cutter grinder bulletin which illustrates the wide range of application of this grinder and assists the operator in the best methods of grinding.





Standardize YOUR HANDLING PROBLEMS with EUCLID CRANES

This photo was taken at one factory of a great industrial empire in whose various plants Euclid Cranes and Hoists are being used in constantly increasing numbers.

Knowing the high standards to which such equipment must measure up for its acceptance and the rigid demands made upon it as to performance, we gratefully regard this significant trend toward Euclid equipment as an implied endorsement of its great worth.

You, too, will find among Euclid Cranes and Hoists a unit that will measure up to your requirements and render for a long period of time the kind of relatively trouble-free service your own exacting standards demand.

THE EUCLID CRANE & HOIST CO.
1361 CHARDON RD., EUCLID, OHIO

WE CAN DELIVER
A LIMITED
NUMBER OF
5 to 10 TON
CRANES
in
60 to 90 Days



NEWS OF INDUSTRY

NAM Job Study Shows Postwar Employment To Top Prewar Figure

New York

• • • Privately-owned American manufacturing industry will provide from 3,400,000 to 4,400,000 more jobs after reconversion from war to peace than it did in the prewar year of 1939, according to Ira Mosher, president of the National Association of Manufacturers. He recently made public results of a survey of the plans of individual manufacturers representing every section of the country and every type of production. The estimate represents an increase of at least one-third over the prewar labor force in manufacturing.

"The manufacturing industry employed 10,600,000 persons in 1939," said Mr. Mosher. "Add the minimum of 3,400,000 additional industrial workers, which our survey indicates will be needed, and we have a total of 14,000,000 men and women who will be needed to produce peacetime goods."

"Manufacturing normally employs about 25 per cent of the total working force of the nation. Should the other elements of our economy be able to make similar increases in employment we would have about 56,000,000 individuals working in our stores, on our farms, in the various services, in local, state and federal governments, and in the other activities that make up our national life. This volume of employment must necessarily depend upon a favorable economic climate, upon how quickly the government lifts its ban on reconversion, and upon a national confidence shared by all elements of our society."

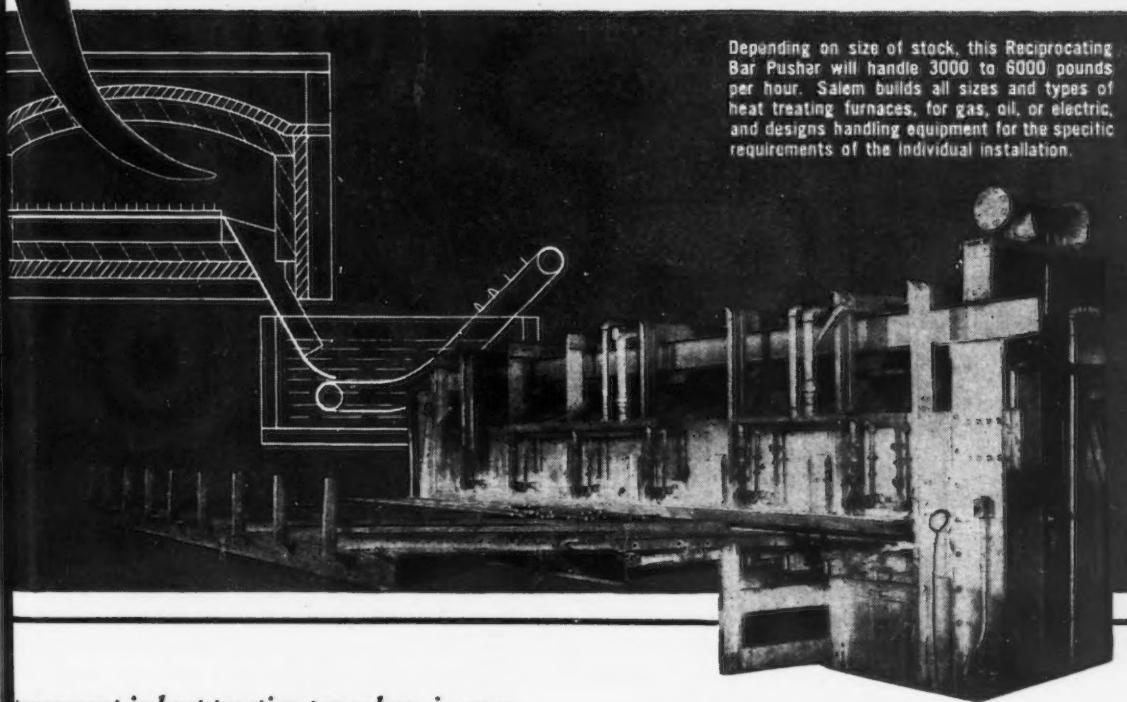
Mr. Mosher made it plain that the figures released by NAM were in no sense to be construed as an overall plan devised by industry for the purpose of creating jobs. Rather, he said, the survey was conducted in an effort to determine just what the plans of individual manufacturers were, and to obtain some indication of the part private industry could play in supplying postwar employment provided proper economic conditions are afforded.

The survey indicates unexpectedly low predictions for unemployment during the transition period when manufacturers will be converting from war to peacetime production. At no time in this period, according to

SALEM APPLIES

ENGINEERED HEAT...

TO HANDLING AND HEAT TREATING BAR STOCK



Depending on size of stock, this Reciprocating Bar Pusher will handle 3000 to 6000 pounds per hour. Salem builds all sizes and types of heat treating furnaces, for gas, oil, or electric, and designs handling equipment for the specific requirements of the individual installation.

Improvement in heat treating procedure, in your plant, may be a matter of efficient handling.

For instance, this Reciprocating Pusher mechanism designed by Salem Engineering Co., handles one bar at a time automatically. Each bar rolls forward (not back and forth) through the furnace on a predetermined time cycle, and drops into the oil or quench tank underneath the furnace.

Each round receives uniform exposure to the heat. You save fuel, since the mechanism only has to be heated once and the automatic

handling speeds production. Several months ago, as a result of proved experience with $\frac{1}{2}$ " to 3" diameter rounds, Salem adapted this mechanism in two large shell plants to the heat treating of 8" shell forgings.

Salem, builders of the world's largest rotary forge furnace and designers of the circular soaking pit, combines engineering with economics in designing furnaces and handling equipment to suit specific heat treating requirements.

Send Salem your next heat treating inquiry.

SALEM

SALEM

ENGINEERING CO.

O.H.I.O

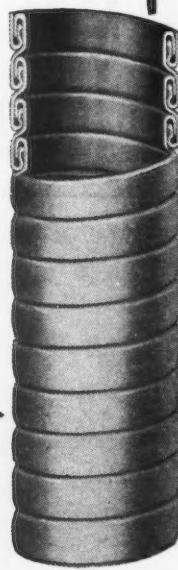


REX-TUBE

T_{op} choice for tough jobs!

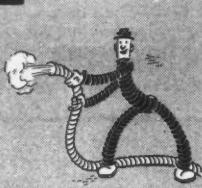
• Put REX-TUBE type RT-15 on your tough, hard-to-handle connection problems. Then watch what happens when this rugged, high-quality flexible metal hose takes charge of the heavy-duty assignments! You can forget all about frequent replacements—costly delays. For RT-15 is famous for its ability to take punishment; to keep right on outperforming and outlasting many other types of hose under the roughest usage you can give it.

There are ample reasons why production men choose REX-TUBE type RT-15 when it comes to taking hard knocks. Illustrated below are just a few of RT-15's many outstanding features. Write us today and ask for Booklet E-144.



REX-TUBE (RT-15)—is strong and well-constructed to take years of wear and tear. Made from heavy strip, steel or bronze. Interlocked design, with inner packing of high-grade asbestos.

REX-TUBE (RT-15)—is widely used for handling steam at low and moderate pressures, for unloading and loading tankers and barges, steaming out tank cars, and other "hot" process jobs.



REX-TUBE—is part of the big, complete C.M.H. family of Flexible Metal Hose. RT-15 is only one type in the REX-TUBE line. There are other REX-TUBE types, in various sizes, with soldered or packed-on couplings, to meet practically any industrial requirement.

Flexible Metal Hose for Every Industrial Use



CHICAGO METAL HOSE CORPORATION
MAYWOOD, ILLINOIS
Plants: Maywood and Elgin, Ill.



estimates based on the manufacturing companies' statements, should factory employment as a whole drop to prewar levels.

Furthermore, the disemployment created by the end of war production will be staggered, and will be partly offset by the voluntary and in many cases permanent withdrawals of several million of the extra workers now in the national labor force. Since the greatest number of those withdrawals are deemed likely to occur in manufacturing, the study further minimizes the probable impact of postwar readjustments in manufacturing employment and enlarges the prospect of opportunities for work.

Such conclusions, dispelling the specter of nationwide unemployment distress after the war, are reported in a study based on statements by 1756 companies, located in 43 states, in the NAM fact-finding survey.

Among other disclosures made by the study are the prospect of more postwar than prewar jobs in 79 per cent of manufacturing companies; job gains averaging 71 per cent in small companies and in certain industry groups ranging as high as 74 per cent; transitional unemployment of 1,416,000 at the most, and that total for only relatively short duration and staggered over a period of months; a great majority of companies able to swing over into peacetime production without any loss of time at all.

The study stipulates that the picture which it presents is not a prophecy and emphasizes the significance of such unknowns as tax rates, price controls, and other factors which affect business operations. It describes the survey as representing "realistic potentials of postwar employment, objectives which manufacturers believe they can reach if they are given a reasonable chance to do so."

It arrives at its total of postwar factory employment by applying to total employment in manufacturing a one-third increase revealed by the survey. It notes exceptions to the general trend, but concludes that the numerous companies moving into new high ground will more than offset the downward pull by the few that have poor prospects.

According to the study, 79 per cent of manufacturing concerns will employ more persons than they did before the war. Sixteen per cent will employ the same number. Five per cent will be down from the prewar level, a decrease which will necessitate



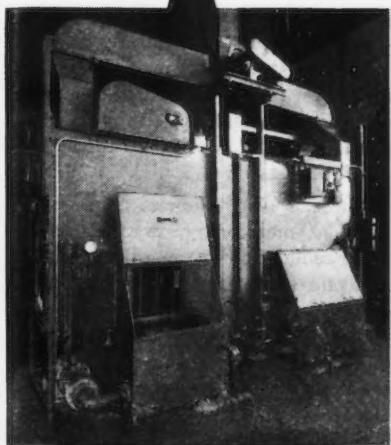
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NEWS OF INDUSTRY



METAL WASHER MAINTENANCE MADE EASY

The improved design and construction of American Metal Washers answers the need for easier, lower-cost maintenance.

Double hinged, man-sized service doors permit entrance without removal of a great number of bolts—two simple locks, hand-operated, make easy access. All pipe unions in American Metal Washers are easily accessible, making nozzle removal possible without entering the machine. Large, hinged covers give access to the solution tanks. All grease nipples are located in a manner that encourages regular lubrication. The float valve on solution tanks maintains liquid at the proper level at all times, and requires no attention. The duplex strainer, under the solution return spout, is so located and designed that ONE can be emptied while the OTHER remains in proper position to permit uninterrupted operation of the machine.

Take the opportunity to contact our engineers. Their background of experience in dealing with metal washing problems and the design of metal washing machines is available in finding the easy, efficient solution to your metal washing problems.



American
FOUNDRY EQUIPMENT CO.
510 S. Byrkit St., Mishawaka, Indiana

some shifting of workers from plants with fewer jobs to the many plants with more.

Small companies are marked for the sharpest job gains. Those with less than 100 employees expect to go to 71 per cent above the prewar level, as an average. Medium-size companies, with from 100 to 5000 employees, expect a gain of 32 per cent. Those employing more than 5000 anticipate a gain of 24 per cent. The average for all sizes of concerns is about one-third.

The auto, aircraft and parts group has an indicated gain of 64 per cent; the electrical group 70 per cent; heavy equipment, which does not include the iron and steel or machinery group, as covered in this survey, 74 per cent. The food and beverage group expects a job increase of about 21 per cent. No industry in the survey anticipates less than the prewar number of jobs.

The study also reveals extensive information on what will happen between the wartime peak and the high level of postwar manufacturing employment when the changeover has been completed. Approximately 61 per cent of all companies will be able to start work on peacetime goods without delay. Twenty-eight per cent will require only from one day to four weeks.

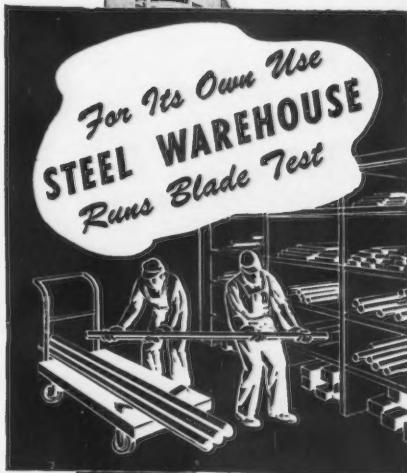
The percentages point up the factor which, because it is frequently overlooked, causes much misunderstanding of employment prospects, that although most of the manufacturing industry is turning out goods for war, most manufacturers do not have readjustment problems, argues Mr. Mosher.

Numerous wartime products are about the same as peacetime articles the study notes. Many plants, machines and procedures require no substantial changes; some none at all.

Only 11 per cent of manufacturing companies are found in need of more than four weeks for getting started on peacetime production.

Certain tight spots are indicated. In the auto, aircraft and parts industries, 436,000 persons may be unemployed for more than 30 days directly due to reconversion. In machinery, 326,000 workers may be off the job for at least four weeks.

Third in line is the iron and steel industry, with possibly 168,000 out of work for 30 days or more. Lumber and furniture products with 124,000 possibly unemployed; textiles with 113,000, and metal products with



and Selects **CAPEWELL** HACKSAW BLADES

An Eastern warehouse, specializing in alloy steels, including stainless, conducted their own tests of hack saw blades. On the basis of their records they selected and placed their orders for Capewell's tough Technite hack saw blades. Do you have a metal sawing job that requires tough blades? Then ask your mill supply house about Capewell's long-life hack saw blades.

CAPEWELL
SAW BLADES
The trend is to TECHNITE.
the molybdenum high speed hack saw blade

THE CAPEWELL MFG. CO.
Hartford, 2, Conn.

82,000 and all other manufacturing with 167,000, bring the estimated total of unemployed over 30 days to 1,416,000, spread over a period of many months. These figures disregard lay-offs of less than four weeks on the ground that unemployment is not very serious when of such short duration.

This total is said to be at variance with some estimates which have been circulated on unemployment when war operations are cut off. It is noted that since reconversion may occur at different times in different industries, thus smoothing out the effects, all these persons will not be unemployed at the same time.

Even at the lowest point, on the basis of the estimates, the number remaining at work in factories will be well above the 1939 peak of 10,600,000. At the end of 12 weeks, those temporarily out of work should be down to 268,000. At the end of 16 weeks, measuring from the time of the first signal for reconversion, they should be down to only 58,000. Virtually all unemployment directly due to reconversion thus would be gone within 16 weeks in any leading industry.

British Metallurgists To Form New Society

New York

• • • According to *Foundry Trade Journal* a new metallurgical group is to be formed in England. Such a move has been under consideration for some time and the new organization will be known as the "Institution of Metallurgists."

A preliminary announcement signed by the members of the first council of the new institution states that it will be registered as a company limited by guarantee. The memorandum and articles of association have been drawn up and will be published as soon as they have been approved by the British Board of Trade. Applications for membership will then be invited.

Membership of the institution will be confined to those who provide satisfactory evidence of professional competence, for which a high standard will be set. When necessary, candidates will be given opportunities of sitting for examinations, but adequate experience in one or more branches of metallurgy will be essential.

One of the objects included in the memorandum of association reads: "To promote in every possible way the interests, and to maintain and increase the status and prestige of metallurgists and to encourage scientists whose main interests lie in metallurgy to become and to designate themselves 'metallurgists.'"

Power is also taken to advance the study of metallurgy, to promote the better education of metallurgists, to maintain a register of qualified members, "to adopt any lawful means conducive to the setting-up and maintenance of a high standard of professional conduct amongst metallurgists" and to collaborate with existing professional and scientific institutions, including especially the [British] Iron and Steel Institute and the [British] Institute of Metals.

The [British] Iron and Steel Institute and the Institute of Metals have given assistance in forming the new body. Their councils addressed the initial invitation to take the legal steps necessary to form the institution to 11 metallurgists, who, acting on a suggestion made in this invitation, invited others; in doing so they aimed at insuring that the institution's first council should be representative of as many interests and districts as possible.

The two institutes have agreed to give secretarial assistance and to provide accommodation. This offer has been gratefully accepted, but no long-term arrangement has been made.

The first council of the Institution of Metallurgists, under the articles of association, are due to retire at the annual meeting in 1946. Future councils will be elected by the members themselves, and it will be for such councils to ascertain and carry out the wishes of the body of members in regard to conditions of membership, subscriptions, and all activities of the new institution.

The first Council are: Messrs. W. E. Alkins, J. H. Andrews, G. Wesley Austin, G. L. Bailey, W. Barr, W. F. Brazener, H. H. Burton, E. W. Colbeck, Maurice Cook, W. J. Dawson, E. Gregory, Roosevelt Griffiths, W. T. Griffiths, R. A. Hacking, J. L. Haughton, J. E. Hurst, J. W. Jenkin, J. Sinclair Kerr, R. Mather, H. Moore, A. J. Murphy, H. O'Neill, R. Seligman, C. J. Smithells, H. Sutton, and F. C. Thompson.

The address of the institution is 4, Grosvenor Gardens, London, S.W.1.



ALLOY STEELS FOR VICTORY

Scientifically selected to conserve critical alloys
and meet the requirements of the AIRCRAFT,
ORDNANCE, and MACHINE TOOL industries.

Complete "EARMARKED" stocks of Aircraft
alloy steels at Buffalo and Detroit.

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126 Sidney Street

Cambridge 39, Mass.

Cleveland 14, Chicago 23, Newark 5, Detroit 3, Buffalo 10, Cincinnati 32

FEATURE CONTINUATION

Tool Engineering Education

(CONTINUED FROM PAGE 75)

more in college these four years than in industry?

ANS. Yes 60%, Undecided 16%, No 24%.

The ayes have it.

13. If not, then would the college training enable one to progress more rapidly in the four or five years in industry after college with the result of a net gain with the same eight or nine years totally involved?

ANS. Yes 88%, Undecided 8%, No 4%.

Even with a negative vote on question No. 12, the answer to No. 13 settles the matter.

14. Do you consider present college faculties competent to teach tool engineering subjects or do they need more actual experience themselves?

ANS. Not competent 87%, ? 17%, O. K. 4%.

Here is an indication of the great indictment of our engineering colleges. Less money paid for football and more for faculty salaries would help. Even existing faculties could and would do much better if the proper incentive and interest were shown in the college. Otherwise get men from industry and pay them what they're worth. Keep abreast of the times and developments in industry.

15. What subjects would you consider most important in a tool engineering course?

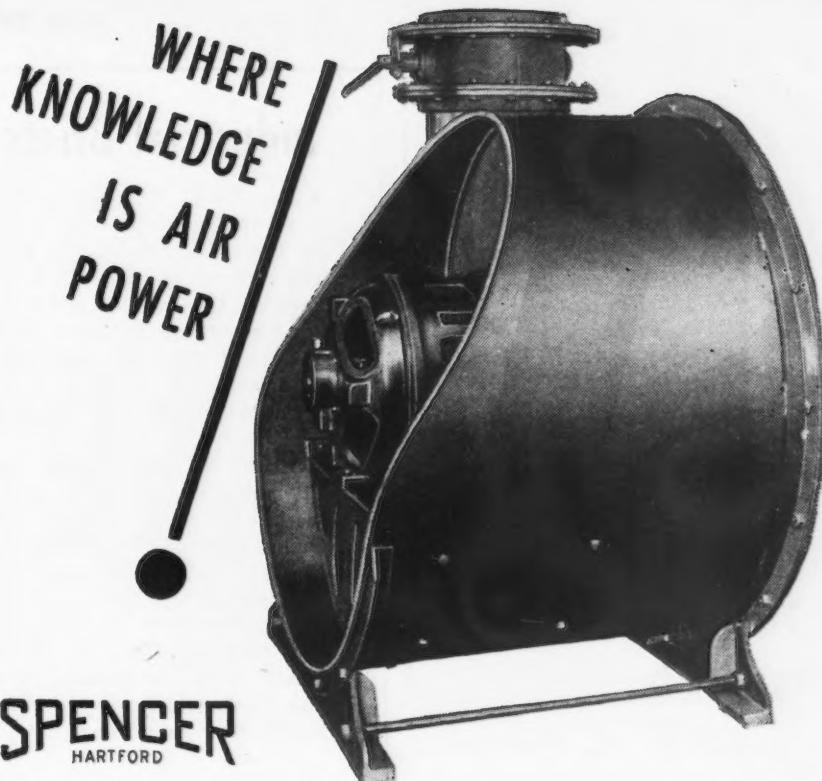
The answer to this question sufficiently conformed to our Proposed College Tool Engineering Course as to convince the ASTE it is on the right track.

16. Would you be willing to give us your opinion of the college course in tool engineering we have prepared? If so, we will send you a copy for review.

ANS. Yes 95%, No 5%.

This should be evidence enough of the interest and thinking of the leaders of American industry. Their expressed willingness to give us further the benefit of their advice and opinions is gratefully accepted and further action will be taken.

The Education and Training Committee of ASTE is ready, anxious and able to assist anyone in the promotion of tool engineering education.



SPENCER
HARTFORD

Knowledge of design and air flow and experienced craftsmen, many of whom have been making Spencer Turbos for a quarter of a century, all contribute to the outstanding records of performance made by Spencer Turbos.

Advancing from the simple application on an oil or gas fired furnace to a score of special applications, from liquid agitation to Link Trainers, the Spencer Turbo-Compressor has scores of uses in industry today.

In addition to bulletins on each of the standard types of Spencer Turbos, we offer the Spencer Turbo Data Book which gives tables, formulas, electrical specifications and a description of many varied applications.

Keep your present Spencers well greased for the duration but plan for new postwar applications now.

THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT

TURBO-COMPRESSORS



**in this
hard-
faced
punch**

After this punch was given a protective overlay of Coast Metals Hard-Facing, it was able not only to turn out several thousand more track links before showing signs of wear, but also to do better and cleaner work. Material and labor costs involved in welding the overlay on the punch were more than compensated for by the much longer punch life obtained. Users of a wide diversity of machines, equipment and products who have enlisted Coast Metals Hard-Facing for making the working surfaces of new or old parts wear-resistant are reporting equally outstanding economies. In one plant it is longer equipment life. In another, fewer shutdowns and less idle labor. In still a third, salvaging and reclaiming worn parts. And so on!

Write for a copy of our new pamphlet "Your Best Protection Against Wear" which goes into full detail.

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**COAST
METALS**
hard-facing weld rods
MAKE YOUR
EQUIPMENT
LAST LONGER

Industrial Briefs . . .

- MANPOWER DECLINES—Chicago factory employment and payroll indexes declined in February from 148.9 and 298.4, respectively, from 150.4 and 301.1 for January and compared with 161.8 and 300.9 for February, 1944, according to Chicago Association of Commerce records.

- ACCIDENTS DROP—Although 51 million man hours were worked in 1944 at plants of Pullman Standard Car Mfg. Co., the accident rate was only 4.10 per million. In 1943, with 49 million manhours worked, the rate was 4.17. Despite an increase in hours worked, 1944 was the fourth consecutive year in which the rate dropped.

- CONTRACT AWARDS—The U.S. Maritime Commission recently announced award of contracts to three shipbuilders for construction of 24 coastal tankers of the T1-M-BK1 type. These awards mark the commission's return to competitive bids and fixed price contracts. The United Concrete Pipe Co., Long Beach, Calif., was the lowest bidder; the New England Shipbuilding Corp., South Portland, Me., the second lowest bidder; and the Avondale Marine Ways, Inc., Westwego, La., the third lowest bidder.

- COMPANY GIFT—Illinois Institute of Technology recently announced an initial grant of \$15,000 from the Ohmite Mfg. Co. to be used for the establishment of a laboratory for the precision measurement of electrical and magnetic quantities.

- 15-YEAR LOAN—The National Gypsum's board of directors has approved arrangements for a \$10,000,000 15-year serial loan to be used to refund outstanding 3 per cent debentures and to provide funds for construction of lime and gypsum plants after the war.

- NEW CONTRACTS—The procurement of new shipbuilding contracts in excess of \$43,000,

- 000 has been announced by Ingalls Shipbuilding Corp., Birmingham, Ala. The corporation has been awarded contracts for seven 18,000-ton, all-welded cargo ships to be assigned the Moore-McCormack Lines and for three sea dredges for the Army Engineers.

- NEW HEADQUARTERS—The entire operation of the Milcor Steel Co. at Canton, Ohio, has moved to Cleveland. In that city Milcor manufacturing and sales will be coordinated with those of the J. M. & L. A. Osborn Co., which was recently purchased by Milcor.

- COMPARISON CHART—A complete tabulation comparison chart of welding electrodes has been released by Allis-Chalmers Mfg. Co., Milwaukee, and may be obtained by writing the company. Comparing equipment from 22 electrode manufacturers, the bulletin contains information on stainless steel and hard surfacing electrodes, as well as the mild steel type.

- NEW MEMBERS—William F. Kopp, assistant secretary and assistant treasurer of the American Propeller Corp., Toledo, and Theodore O. Liebscher, secretary-treasurer of the Le Roi Co., Milwaukee, have been elected to membership in the Controllers Institute of America.

- MICHIGAN BRANCH—The Yoder Co., Cleveland, will be represented in the Michigan area by a direct factory branch, with offices in the Maccabees Building, Detroit. E. C. Murdoch has been appointed manager of the new office.

- ACQUISITION—The Alexander Milburn Co., Baltimore, has been taken over by the newly organized Black Mfg. Co. The new organization will operate under existing patents and patents pending of the former Alexander Milburn Co.

Foreign Briefs . . .

• FRANCE—The bauxite mines of Herault & Var have ceased operation. Aluminum production amounted to 1700 tons in November, 1944, as against 2100 tons in November, 1943.

• SWEDEN — Bofors has acquired a large piece of land near Karlsskoga, on which a new forge will be erected. The company is also planning the construction of a new rolling mill. The Scandinavian Iron-works, in order to meet increased postwar demands, will build a plant including a new cold-rolling mill and enlargement of the existing electro-steel plant.

• PERU—Work has begun on a new iron and steel works to be erected at Chimbote, hitherto an undeveloped part of the country. Marcona iron ore deposits near the bays of S. Nicolas and S. Juan are being explored prior to actual construction work. H. A. Brassert & Co. are consulting engineers for the project.

• ENGLAND—Marine steam turbine research work will be carried out at an experimental station which is being erected on land adjoining the Wallsend works of the Parsons Marine Steam Turbine Co., Ltd. The project will be carried out by the Parsons & Marine Engineering Turbine Research & Development Association.

• SWITZERLAND — Switzerland, an importer of ferrosulphur from Germany for use in steel production at the Lanza Works, is reported to be looking around for a source of supply in the United States, where there is no known production of this alloy.

• ENGLAND—Considerable advances in the field of plastic molding will be made by the British industry in the post-war period, according to A. E.

Davey, vice-president of Injection Moulders, Ltd., London, largest custom molders of thermo-plastics in Great Britain. Mr. Davey is now in the United States arranging for the shipment of additional Lester injection molding machines.

• BRAZIL — According to the *Bulletin of the Federal Council for Foreign Trade* pig iron output in Brazil amounted to 129,469 metric tons during the first half of 1944, compared with 106,958 metric tons during the same period of 1943.

Output of steel during the first half of 1944 was 99,379 metric tons, compared with 82,063 tons during the same period of 1943. The production of laminated and rolled iron and steel during the first six months of 1943 and 1944 was 69,959 and 78,894 metric tons, respectively.

National Steel Mill at Volta Redonda and National Motor Factory near Rio de Janeiro are both reported to be in a position to permit the Brazilian production of motor trucks and tractors, as well as low-priced cars.

• NORWAY—Norway has been granted a credit of about \$50,000,000 to be used for goods and materials to be delivered as soon as it is liberated. Agreement has been reached on a three-year program for Swedish aid in the rebuilding of Norway's merchant marine. For partial financing of this program, a credit of about \$9,000,000 has been granted by Sweden. Some 30 vessels have already been built at Swedish shipyards and will be delivered as soon as Norway is able to receive them.

• SPAIN — Excavations under the old Seville custom house have revealed a deposit of 6000 tons of mercury, stocked there in the sixteenth century for export to America.

GETTING WHAT ONE WANTS

"What Will You Have

?
Pay for it and take it
!"

RALPH WALDO EMERSON

The Sage of Concord wrote usually of matters somewhat idealistic. His dictum was that if a man desired to be a printer, a preacher or a successful businessman, he must pay for his achievement in the coin of training, work and sacrifice. He believed in the law of compensation and that nothing is gained without effort.

The head of one of America's fine enterprises has said much the same thing in different words:—"Nothing was ever made, but someone could make it worse and sell it cheaper."

Still another, whose name also is A.W.O.L. sounds a variation: "We always pay for what we get, but we don't always get what we pay for."

In ancient days, alchemists sought a process of transmuting base metals into gold. But it remained for Henry Ford to do the trick by transforming iron ore into steel, steel and other materials into automobiles, and these into much, very much gold.

In short, you don't get something for nothing—and the man who knows what he wants and is willing to pay fairly for it, usually makes the best trade.

It is no military secret what every American wants after Victory—a long period of sound prosperity. The ideal way to get it is to buy Bonds again and again . . . and hold them.

UNIVERSAL PRECISION BALLS

OF STEEL, BRONZE AND SPECIAL MATERIALS

PRODUCTS OF
VULCANITE PORTLAND CEMENT CO.

WILLOW GROVE, Montgomery County, Pa.

Established 1894

Telephone: Willow Grove 1200

MACHINE TOOLS

. . . News and Market Activities

RFC Perfects Plans To Sell 134 Machine Tools

Washington

• • • Called the closest approach practicable to the store-counter method, RFC has set up a procedure for the sale of surplus machine tools, 10 years and older. If the plan effects the wide distribution sought, it will be followed in subsequent offerings of such equipment. The first test will be applied to the sale of 134 machine tools at the Watervliet, N. Y., arsenal. The total cost of these tools was \$1,123,990.

The following are the four principal steps in the procedure for selling these machine tools: (1) Detailed descriptive lists are being circulated through six RFC disposing agencies—New York, Boston, Philadelphia, Chicago, Detroit, and Cleveland; (2) data concerning the offering may also be obtained by interested bidders in all parts of the country simply by addressing an inquiry to the manager of the RFC Disposing Loan Agency in his region; (3) the tools will be available for inspection at the Watervliet arsenal from April 16 to 21, inclusive; (4) sealed bids will be opened publicly on April 24 in the offices of the RFC Disposing Loan Agency, 70 Pine Street, New York.

Tool Men Await Orders; Reconversion Plans Dusted

Cincinnati

• • • Increasingly good war news has stimulated postwar as well as contract termination thoughts among machinery men in this area. Of course, nothing definite has been determined nor has any governmental action produced current considerations. The trade generally, however, is brushing off reconversion plants and getting ready for the change to other than war production against the day when more normal conditions prevail. Some inquiry for postwar tooling has been received and more interest has been noted in recent weeks. Currently, however, war business continues unabated and new ordering is moving in the same rate that has prevailed for sometime. Deliveries are well extended with backlog now pushing ship-

ment dates toward the end of summer. The production continues at full capacity within the limitations of present labor supply.

Armor Piercing Shell Uses Tungsten Carbide Core in Light Casing

Detroit

• • • Details of a new type of armor piercing projectile were revealed here late last week, simultaneously with announcement that the developer of the weapon, Carboly Co., Inc., has been awarded, through its Ordnance Division, a \$6,000,000 Ordnance contract to build a new DPC smelter and production plant at Natrium, W. Va.

The new plant will occupy 250,000 sq. ft. on a 72-acre site. When completed it will be the largest tungsten ore reducing plant in the world, able to process all types of this ore, and production costs are expected to be well below previous standards. The plant is located near the Columbia Chemical Works, whose hydrogen by-product, produced during chlorine manufacture, is importantly needed to reduce tungsten ores.

The new projectile developed by Carboly replaces the ordinary steel body with a tungsten carbide core encased in aluminum and steel. This permits a smaller diameter armor-piercing core to be fired from a larger bore gun. More important, weight is greatly reduced; for the 76 mm. gun, for example, about half the weight is contained in the core, putting the total projectile's weight around 9 lb., compared with about 15 lb. for a conventional type. As a result, muzzle velocity is increased from 2800 ft. per sec. to approximately 3400 ft. per sec.

The tungsten carbide core is sintered to close enough dimensions to eliminate any need for grinding except on the rear end, which must rest flush against the shell base. Aside from the steel base, the rest of the piece is aluminum windshield and body. The core penetrates armor, then breaks into shrapnel. Cost is definitely higher than for orthodox projectiles with bar steel bodies, but Ordnance feels the increased effectiveness is more than worth the expense. It did not appear that the projected plant at Natrium

would be cancelled out in common with reported cancellations of other phases of the ammunition program.

The tungsten carbide cores differ from carbides used for tool bits in one major respect, in that their binder is nickel rather than harder-to-get cobalt. In the approved Ordnance announcement of the project was also a hint that scrap carbine can be utilized for core production, although this was not enlarged on.

Tool Engineers Group Elects C. V. Briner President

Detroit

• • • The thirteenth annual meeting of the American Society of Tool Engineers, held in Detroit, March 23-24, resulted in the election of the following: President, C. V. Briner, manager, Gage and Tool Division, Pipe Machinery Co., Cleveland; first vice-president, A. M. Sargent, president and general manager, Pioneer Engineering & Mfg., Detroit; secretary, A. M. Schmidt, general manager, A. M. Schmidt Co., Toledo; and treasurer, W. J. Frederick, president, Frederick Steel Co., Cincinnati.

Effective Date on Diamond Powder Standards Is May 5

Washington

• • • The effective date for new production of diamond powder used in the manufacture of grinding wheels for the grinding of carbide cutting tools has been changed from April 5 to May 5, 1945. This action taken by the National Bureau of Standards concerns the newly adopted commercial standard for the grading of diamond powder CS123-45. Postponement of the effective date was requested by manufacturers who state that printers are unable to prepare the required printed matter in sufficient time.

Allegheny Ludlum Net Drops

Pittsburgh

• • • Allegheny-Ludlum Steel Corp. reports net earnings for 1944 totaled \$3,607,814, after tax deductions of \$12,360,401. This compares with \$3,932,898 earned in 1943 when federal and miscellaneous tax deductions totaled \$13,824,858.

CHECK ANOTHER SUPER "FIRST"



NOW... Solid Tungsten Carbide Reamers Available

from Stock!

Good news for users of small reamers! Super Tool Company now stocks solid tungsten carbide reamers in sizes down to 125". Now you can order these small size reamers and get quick deliveries without the delays that resulted when they had to be manufactured on special order.

And here is more good news! Because of Super Tool's advanced manufacturing techniques these small solid tungsten carbide reamers now can be furnished on special orders in sizes as small as .09375".

Next time you need small size reamers, specify SUPER and get the better performance, the cleaner cuts, the precision work and the greater production economies that Tungsten Carbide can bring to your cutting jobs.

Write TODAY for complete data and prices on Super Standard Solid Tungsten Carbide Reamers.

**Whatever
YOUR CUTTING JOB
LOOK FIRST TO
SUPER**

**CARBIDE TIPPED
TOOLS FOR**
Turning, Facing
Reaming Forming
Spot Facing
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SUPER TOOL COMPANY

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21650 Hoover Road, Detroit 13, Michigan



★ 4105 San Fernando Road, Glendale 4, California

NON-FERROUS METALS

. . . News and Market Activities

WPB Reduces Tungsten For High Speed Steel

Washington

• • • Urgent need for tungsten for war requirements has caused WPB to revise the formula adopted last August to reduce the amount of tungsten used for high speed steel.

Steels containing more than 12.0 per cent tungsten and not less than 0.55 per cent carbon are now being restricted to 15 per cent of melting and delivery schedules for high speed steels. The balance of high speed steel requirements, 85 per cent, is to be comprised of compositions containing less than 6.75 per cent tungsten, more than 3 per cent molybdenum and not less than 0.60 per cent carbon.

The restrictions are contained in order M-21-j issued April 7.

Stocks of Molybdenum Concentrates Lower

Washington

• • • Stocks of molybdenum concentrates in the hands of producers and consumers at the end of January had reached 18.25 million lb. in contained molybdenum according to the first report in a new series being issued by the Bureau of Mines. This represents a monthly drop of approximately a

million pounds since October, which is said by producers to have been caused by shortages of labor at the mines and mills. Six of the ten producers reporting for January are obtaining molybdenum concentrates as a byproduct of copper production.

These statistics do not include government stocks of foreign molybdenite held by the Metals Reserve Co.

March Zinc Shipments Hit Peak; Stocks Drop

New York

• • • Slab zinc shipments reported by the American Zinc Institute have increased in March by 11,639 net tons to an all time high of 94,494 tons. This figure compares with a monthly average in 1944 of 69,777 tons. February shipments had dropped nearly 10,000 tons from the former high of 92,453 tons during January due to cold weather and transportation tieups.

Slab zinc stocks reported by institute members are dropping rapidly in recent months. More than 246,000 tons at the end of November, they had dropped to 174,672 tons at the end of March.

It is anticipated in the trade that this high rate of zinc shipments will not be continued in April because con-

sumers have become inventory minded and in some instances have not found it necessary to order the full amount of allocations.

WPB to Reconsider Lead Position Soon

New York

• • • In addition to revising the lead order M-38 to list 64 permissive uses for lead and eliminate separate listings of restricted and unrestricted uses and quota percentage restrictions, WPB has found it necessary to restrict further the use of lead for collapsible tubes and has amended order M-115. In this connection WPB promises to review the entire lead situation later in April.

The short supply position of lead which has stimulated the concern of government officials and industry men has tended to prevent the easing of demand for April shipments which is apparent in some other metals. Consumers have recognized the shortage and are not gaging their purchases of lead by the imminence of victory in Europe.

Tungsten Producer Increases Prices

New York

• • • One of the producers of ferrotungsten and tungsten metal powder has announced increases in prices of these products effective April 1. These increases are said to be required by the necessity for using larger quantities of lower grade ores, and generally increased production costs. However they do not exceed established OPA maximum prices.

Ferrotungsten prices for $\frac{1}{4}$ in. \times down size per lb. contained tungsten follow: 10,000 lb. or more, \$1.90; 2000 to 10,000 lb., \$2.00; 100 to 2000 lb., \$2.10; less than 100 lb., \$2.15.

Tungsten metal powder 65 mesh \times down, packed, containing not less than 97 per cent tungsten, per lb. of powder: 1000 lb. or more, \$2.50; less than 1000 lb., \$2.60.

Delivery of both products is fob. cars, Niagara Falls, N. Y. Freight is allowed to St. Louis, or its equivalent rate, on shipments of tungsten powder and shipments of 2000 lb. or more of ferrotungsten.

Molybdenum Concentrates* in the United States, Molybdenum Content in Lbs.

	Production	Shipments†	Stocks at End of Period		
			Producers'	Consumers'	Total ‡
1941—					
July-December.....	22,477,500	23,558,200	17,352,400	3,852,400	21,204,800
1942.....	56,942,300	66,437,300	7,857,400	4,682,500	12,539,900
1943.....	61,666,800	53,955,400	15,568,800	2,242,093	17,810,893
1944—					
January-December ¶.....	38,534,300	39,420,400	15,007,300	4,358,290	19,365,590
1944—					
January.....	3,891,200	2,823,700	16,575,600	2,041,547	18,617,147
February.....	3,227,800	2,766,500	17,036,900	2,610,181	19,647,081
March.....	2,947,300	2,788,100	17,216,100	3,147,626	20,363,726
April.....	2,907,900	2,665,500	17,484,300	3,371,807	20,856,107
May.....	3,192,400	3,010,100	17,666,600	3,772,971	21,439,571
June.....	2,736,700	2,350,400	18,352,000	3,822,400	22,174,400
July.....	2,766,000	3,815,000	17,363,400	3,675,923	21,039,323
August.....	3,774,800	3,561,200	17,577,000	4,401,880	21,978,880
September.....	3,637,500	4,798,600	16,417,900	4,843,144	21,261,044
October.....	3,316,000	2,939,700	16,794,200	4,870,927	21,665,127
November.....	3,084,800	4,046,500	15,832,500	4,540,658	20,373,158
December.....	3,051,900	3,877,100	15,007,300	4,358,290	19,365,590
1945—					
January.....	3,133,900	4,096,000	14,045,200	4,203,699	18,248,899

* Includes crude smelter salts from complex ores. † To domestic consumers and for export. ‡ Excludes government stocks. ¶ Based on annual canvass. ¶ Preliminary.

NONFERROUS METALS PRICES

Primary Metals

(Cents per lb., unless otherwise noted)

Aluminum, 99+%	15.00
10,000 lb.)	
Antimony, American, Laredo, Tex.	14.50
Beryllium copper, 3.75-4.25% Be;	
dollars per lb. contained Be	\$17.00
Cadmium, del'd	90.00
Cobalt, 97-99% (per lb.)	\$1.50 to \$1.57
Copper, electro, Conn. valley	12.00
Copper, electro, New York	11.75
Copper, lake	12.00
Gold, U. S. Treas., dollars per oz.	\$35.00
Indium, 99.9%, dollars per troy oz.	\$4.00
Iridium, dollars per troy oz.	\$120.00
Lead, St. Louis	6.35
Lead, New York	6.50
Magnesium, 99.9 + %, carlots	20.50
Magnesium, 12-in. sticks, carlots	27.50
Mercury, dollars per 76-lb. flask,	
f.o.b. New York	\$160.00 to \$165.00
Nickel, electro	35.00
Palladium, dollars per troy oz.	\$24.00
Platinum, dollars per oz.	\$35.00
Silver, open market, New York, cents per oz.	44.75
Tin, Straits, New York	52.00
Zinc, East St. Louis	8.25
Zinc, New York	8.65

Remelted Metals

(Cents per lb. unless otherwise noted)

Aluminum, No. 12 Fdy. (No. 2)	9.00 to 10.00
Aluminum, deoxidizing	
No. 2, 3, 4	\$6.00 to 9.50
Brass Ingots	
85-5-5 (No. 115)	13.25
88-10-2 (No. 215)	16.75
80-10-10 (No. 305)	16.00
No. 1 Yellow (No. 405)	10.25

Copper, Copper Base Alloys

(Mill base, cents per lb.)

Extruded Shapes Rods Sheets	
Copper	20.87
Copper, H.R.	17.37
Copper drawn	18.37
Low brass, 80%	20.40
High brass	19.48
Red brass, 85%	20.61
Naval brass	20.36
Brass, free cut	19.12
Commercial bronze, 90%	15.01
Commercial bronze, 95%	21.32
Manganese bronze	21.53
Gongs, 24.00	28.00
Phos. bronze, A, B, 50%	36.50
Muntz metal	20.12
Everdur, Herculoy, Olympic or equal	25.50
Nickel silver, 5%	28.75
Architect bronze	19.12

Aluminum

(Cents per lb., subject to extras on gage,
size, temper, finish, factor number, etc.)

Tubing: 2 in. O.D. x 0.065 in. wall 2S,
40c. (1/2H); 52S, 61c. (O); 24S, 67 1/2c.
(T).

Plate: 0.250 in. and heavier; 2S and
3S, 21.2c.; 52S, 24.2c.; 61S, 22.8c.; 24S,
24.2c.

Flat Sheet: 0.188 in. thickness; 2S and
3S, 22.7c. a lb.; 52S, 26.2c.; 61S, 24.7c.;
24S, 26.7c.

2000-lb. base for tubing; 30,000-lb. base
for plate, flat stock.

Extruded Shapes: "As extruded" tem-
per: 2000-lb. base, 2S and 3S, factor No.
1 to 4, 25.5c.; 14S, factor No. 1 to 4,
35c.; 17S, factor No. 1 to 4, 31c.; 24S,
factor No. 1 to 4, 34c.; 53S, factor No. 1
to 4, 28c.; 61S, factor No. 1 to 4, 28 1/2c.

The factor is determined by dividing
perimeter of shape by weight per lineal
foot.

Wire Rod and Bar: Base price; 17ST
and 11ST-3, screw machine stock.
Rounds: 1/4 in., 28 1/2c. per lb.; 1/2 in.,
26c.; 1 in., 24 1/2c.; 2 in., 23c. Hexago-
nals: 1/4 in., 34 1/2c. per lb.; 1/2 in., 28 1/2c.;
1 in., 25 1/2c.; 2 in., 25 1/2c. 2S, as fabri-
cated, random or standard lengths, 1/4 in.,
24c. per lb.; 1/2 in., 25c.; 1 in., 24c.; 2 in.,

23c. 24ST, rectangles and squares, ran-
dom or standard lengths. 0.093-0.187 in.
thick by 1.001-2.000 in. wide, 33c. per lb.;
0.751-1.500 in. thick by 2.001-4.000 in.
wide, 29c.; 1.501-2.000 in. thick by 4.001-
6.000 in. wide, 27 1/2c.

Magnesium

Sheet, rod, tubes, bars, extruded shapes
subject to individual quotations. Metal
turnings: 100 lb. or more, 46c. a lb.; 25
to 90 lb., 56c.; less than 25 lb., 66c.

NONFERROUS SCRAP METAL QUOTATIONS

*(OPA basic maximum prices, cents per lb., f.o.b. point of shipment, subject to quality,
quantity and special preparation premiums—other prices are current quotations)*

Copper, Copper Base Alloys

OPA Group 1†

No. 1 wire, No. 1 heavy copper	9.75
No. 1 tinned copper wire, No. 1 tinned heavy copper	9.75
No. 2 wire, mixed heavy copper	8.75
Copper tuyeres	8.75
Light copper	7.75
Copper borings	9.75
No. 2 copper borings	8.75
Lead covered copper wire, cable	6.00*
Lead covered telephone, power cable	6.04
Insulated copper	5.10*

OPA Group 2†

Bell metal	15.50
High grade bronze gears	13.25
High grade bronze solids	11.50*
Low lead bronze borings	11.50*
Babbitt lined brass bushings	13.00
High lead bronze solids	10.00*
High lead bronze borings	10.00*
Red trolley wheels	10.75
Tinny (phosphor bronze) borings	10.50
Tinny (phosphor bronze) solids	10.50
Copper-nickel solids and borings	9.25
Bronze paper mill wire cloth	9.50
Aluminum bronze solids	9.00
Soft red brass (No. 1 composition)	9.00
Soft red brass borings (No. 1)	9.00
Gilding metal turnings	8.50
Contaminated gilded metal solids	8.50
Unlined standard red car boxes	8.25
Cocks and faucets	7.75
Mixed brass screens	7.75
Red brass breakage	7.50
Old nickel silver solids, borings	6.25
Copper lead solids, borings	6.25
Yellow brass castings	6.25
Automobile radiators	7.00
Zincy bronze borings	8.00
Zincy bronze solids	8.00

OPA Group 3†

Fired rifle shells	8.25
Brass pipe	7.50
Old rolled brass	7.00
Admiralty condenser tubes	7.50
Muntz metal condenser tubes	7.00
Plated brass sheet, pipe reflectors	6.50
Manganese bronze solids	7.35*
Manganese bronze solids	6.25*
Manganese bronze borings	6.50*
Manganese bronze borings	5.50*

OPA Group 4†

Refinery brass	4.75*
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*Price varies with analysis. ¹Lead content 0.00 to 0.40 per cent. ²Lead content 0.41 to 1.00 per cent.

ELECTROPLATING ANODES AND CHEMICALS

Anodes

(Cents per lb., f.o.b. shipping point in
500 lb lots)

Copper, frt. allowed	
Cast, oval, 15 in. or longer	25%
Electrolytic	22%
Rolled, oval, straight	19%
Curved	20%
Brass, 80-20, frt. allowed	
Cast, oval, 15 in. or longer	23%
Zinc, cast, 99.99, 15 in. or longer	16%
Nickel, 99 per cent plus, frt. allowed	
Cast	47
Rolled, depolarized	48
Silver, 999 fine	
Rolled, 1-9 troy oz., per oz.	58*

Chemicals

(Cents per lb., f.o.b. shipping point)

Copper cyanide, 1-5 bbls.	34.00
Copper sulphate, 99.5, crystals, bbls.	7.75
Nickel salts, single, 425 lb. bbls., frt. allowed	13.50
Silver cyanide, 100 oz. lots	40.82*
Sodium cyanide, 96 per cent, do- mestic, 100 lb. drums	15.00
Zinc cyanide, 100 lb. drums	33.00
Zinc sulphate, 89 per cent, crys- tals, bbls., frt. allowed	6.85

*Price based on use of foreign silver.

SCRAP

... News and Market Activities

MPR-4 Revised to Aid Scrap Flow

Washington

• • • Brokers have been authorized by OPA, effective April 14, to charge their commission of 50c. per gross ton on iron and steel scrap sold at the same price at which it was purchased, even though this price may be below the ceiling. Since last Nov. 16, brokers have been permitted to charge their commission on sales only if the scrap was purchased and sold at the maximum prices provided by the regulation.

Other changes include a revision of the number of grades and specifications of railroad scrap in line with changes in railroad specifications made by AAR.

Section 7 (a) (2) is amended to read as follows: Differentials per gross ton above or below the price of Grade 1 (No. 1 railroad heavy melting steel) for other grades of railroad steel scrap:

<i>Grades</i>	<i>Differentials</i>
2. No. 2 heavy melting steel	\$ Base
3. No. 2 steel wheels	Base
4. Hollow bored axles	Base
5. No. 1 busheling	-1.00
6. No. 2 busheling	-3.50
7. No. 1 turnings	-1.60
8. No. 2 turnings, drillings and borings	-6.00
9. No. 2 cast steel	-3.50
10. Uncut frogs and switches	.50
11. Flues, tubes and pipes	-3.50
12. Structural, wrought iron and/or steel, uncut	-3.50
13. Destroyed steel cars	-3.50
14. No. 1 sheet scrap	-5.00
15. No. 2 sheet scrap	-7.00
16. Scrap rails, random lengths	+.50
17. Rerolling rails	+2.50
18. Cut rails, 3 feet and under	+2.50
19. Cut rails, 2 feet and under	+3.00
20. Cut rails, 18 inches and under	+3.75
21. Cast steel, No. 1	+2.50
22. Uncut tires	+2.50
23. Cut tires	+4.50
24. Uncut bolsters and side frames	Base
25. Cut bolsters and side frames	+2.50
26. Angle and splice bars	+2.50
27. Solid steel axles	+6.00
28. Steel wheels, No. 3, oversize	+3.50
29. Steel wheels, No. 3	+3.50
30. Spring steel	+3.50
31. Couplers and knuckles	+3.50
32. Wrought iron	+5.50

Provisions governing dealers' sales of railroad scrap have been changed to permit dealers or contractors who demolish railroad equipment upon the property of a railroad to sell the heavy melting steel gotten at the ceiling prices established for No. 1 heavy melting railroad scrap. This gives such scrap sellers an increase of \$1 per gross ton over the dealer and industrial ceiling price that previously governed such sales.

Preparation-in-transit provisions of the regulation are broadened to in-

clude in-transit preparation of cast iron on all sales. Previously in-transit preparation charges could be made only on cast iron sold under allocation by WPB. Zone C is the principal eastern steel industry producing area, and comprises the Central and Eastern United States, including Pittsburgh, Chicago, Detroit, New York and New England. The action, taken because of what OPA says is a serious shortage of cast iron scrap, is designed to stimulate the flow.

The regulation now covers all export scrap or scrap sold to an exporter. Formerly, the ceiling prices for iron and steel scrap have applied to scrap sold for export if the exporter was a broker or the foreign buyer was a consumer or broker.

PITTSBURGH — While the turnings market is firm, there has been no increase in prices. The strengthening of turnings prices in other districts has not yet been reflected here. Better weather has facilitated the scrap movement, but the supply is not sufficient to meet all demands. The coal strike here is placing a heavier burden on scrap, with mills trying to conserve pig iron as much as possible so as to stretch operations out and forestall the day that the coal shortage will force a general curtailment of operations.

CHICAGO — There was no change of consequence this week in the scrap market here except that continued sales now establish the machine turnings price in a \$9.00 to \$9.50 range. Blast furnace grades are selling in a wider range than heretofore. Open hearth grades continued in demand. There was some heightened interest in alloy scrap on which premiums for content are being paid on a few specifications.

BUFFALO — Steelmaking grades of scrap were in the same old rut this week, with plentiful supplies of turnings being put to maximum use in open hearths and blast furnaces to compensate for the scarcity of heavier material. Pressure for specialties for steel foundries appeared less urgent, but demand for low phosphorus was as strong as ever. The season's first cargo of scrap from the Upper Lakes is due to arrive over the weekend. Several canal barges are reported already loading scrap in New York for Buffalo, but none of these is expected to leave for another week because of high water in the state canal system. No canal scrap is looked for at the local terminal before the end of the month.

PHILADELPHIA — Because of the extremely heavy supply of turnings during

the past few weeks, two mills here have held up shipments of these grades. One of these mills in fact is holding up shipments of all grades. Shipments, in general, are fairly good but it is not expected that the heavy grades will experience any price change before V-E day. Turnings, however, are expected to drop below ceiling levels as soon as old orders have been filled and mills start reordering. No mill is willing to make any long term commitments and all prefer hand-to-mouth purchases.

NEW YORK — All grades continue at ceilings in this district but there is evidence in reports from dealers that mills are torn between the need for replenishing their present minimum supplies and the immediate prospect of cancellation and the danger of accumulating excessive supplies. However, dealers feel that mills cannot go wrong in purchases at the relatively low ceilings maintained during this war. Larger mills are said to be freely accepting scrap offerings and smaller mills are said to be holding back. There is no improvement in the scrapyard labor situation.

BOSTON — The slight improvement in business noted a week ago is holding, but shipments are far below those of prewar years. Lack of labor to prepare material is a big yard problem, and there has been a recurrence of freight car shortages in certain localities. Business is confined very largely to turnings, an odd carlot of heavy steel, and truckloads of cast, low phos plate and tubing. WLB has granted permission to yards to augment their number of workers. Unfortunately government employment agencies cannot furnish additional help. Some yards are more anxious than ever not to take in unprepared scrap just now, presumably because they fear steel mills may be forced to greatly reduce operations because of a coal shortage. Yards don't want to be caught with a lot of unprepared scrap on their hands.

CLEVELAND — There are no price changes here, but with the amount of turnings produced in the Cleveland area, there is some possibility that sales might be made at a lower level in the next few days. As yet, however, there have been no such sales to justify a reduction. Mills, whose inventories are in better shape than they were a month ago, are still after open hearth which is hard to get.

CINCINNATI — Melting, heavy melting steel and open hearth scrap grades continue to be quotable at ceiling with demands brisk. Blast furnace scrap, on the other hand, still shows a weakness with the demand fair. Business, however, is not very live, although mills are apparently taking all tonnage due on old commitments. Supply of materials is sufficient, at least, to take care of current needs and might be described as reasonably adequate.

IRON AND STEEL SCRAP PRICES

Going prices as obtained in the trade by IRON AGE editors, based on representative tonnages
 (for ceiling prices see O. P. A. schedule No. 4). Where ceiling prices are quoted they do not include
 brokerage fee or adjusted transportation charges. Asterisks indicate grades selling at ceilings.

PITTSBURGH

Per gross ton delivered to consumer:	
No. 1 hvy. melting	\$20.00*
RR. hvy. melting	21.00*
No. 2 hvy. melting	20.00*
RR. scrap rails	21.50*
Rails 3 ft. and under	23.50*
No. 1 comp'd sheets	20.00*
Hand bldd. new shts.	20.00*
Hvy. axle turn.	19.50*
Hvy. steel forge turn.	19.50*
Mach. shop turn.	\$13.00 to 13.50
Short shov. turn.	15.50 to 16.00
Mixed bor. and turn.	13.00 to 13.50
Cast iron borings	14.50 to 15.00
Hvy. break. cast	16.50*
No. 1 cupola	20.00*
RR. knuck. and coup.	24.50*
RR. coil springs	24.50*
Rail leaf springs	24.50*
Rolled steel wheels	24.50*
Low phos. bil. crops	25.00*
Low phos.	22.50*
RR. malleable	22.00*

CHICAGO

Per gross ton delivered to consumer:	
No. 1 hvy. melting	\$18.75*
No. 2 hvy. melting	18.75*
No. 1 bundles	18.75*
No. 2 dealers' bndls.	18.75*
Bundled mach. shop turn.	16.25 to 16.75
Galv. bundles	14.25 to 14.75
Mach. shop turn.	9.00 to 9.50
Short shovel. turn.	10.50 to 11.00
Cast iron borings	10.50 to 11.00
Mix. borings & turn.	10.50 to 11.00
Low phos. hvy. forge	23.75*
Low phos. plates	21.25*
No. 1 RR. hvy. melt.	19.75*
Reroll rails	22.25*
Miscellaneous rails	20.25*
Rails 3 ft. and under	22.25*
Locomotive tires, cut	24.25*
Cut bolsters & side frames	22.25*
Angles & Splice bars	22.25*
Standard stl. car axles	25.75*
No. 3 steel wheels	22.75 to 23.25
Couplers & knuckles	23.25*
Agricul. malleable	22.00*
RR. malleable	22.00*
No. 1 mach. cast	20.00*
No. 1 agricul. cast	20.00*
Hvy. breakable cast	16.50*
RR. grate bars	15.25*
Cast iron brake shoes	15.25*
Stove plate	19.00*
Clean auto cast	20.00*
Cast iron carwheels	20.00*

CINCINNATI

Per gross ton delivered to consumer:	
No. 1 hvy. melting	\$19.50*
No. 2 hvy. melting	19.50*
No. 1 bundles	19.50*
No. 2 bundles	19.50*
Mach. shop turn.	\$8.00 to 8.50
Shoveling turn.	9.00 to 9.50
Cast iron borings	8.50 to 9.00
Mixed bor. & turn.	8.00 to 8.50
Low phos. plate	22.00*
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Stove plate	19.00*
Scrap rails	21.50*

BOSTON

Dealers' buying prices per gross ton, f.o.b. cars	
No. 1 hvy. melting	\$15.05*
No. 2 hvy. melting	15.05*
No. 1 and 2 bundles	15.05*
Busheling	15.05*
Turnings, shovellings	\$11.00 to 11.06
Machine shop turn.	9.00 to 9.06
Mixed bor. & turn.	9.00 to 9.06
Cl'n cast, chem. bor.	13.06 to 14.15*
Track delivery to foundry	
Machinery cast	21.00 to 23.51*
Breakable cast	21.57 to 21.87*
Stove plate	10.00 to 23.51*

DETROIT

Per gross ton, brokers' buying prices:	
No. 1 hvy. melting	\$17.32*
No. 2 hvy. melting	17.32*
No. 1 bundles	17.32*
New busheling	17.32*
Flashings	17.32*
Mach. shop turn.	\$9.00 to 9.50
Short shov. turn.	11.00 to 11.50
Cast iron borings	10.00 to 10.50
Mixed bor. & turn.	9.00 to 9.50
Low phos. plate	19.82*
No. 1 cupola cast	20.00*
Charging box cast	18.00 to 19.00
Hvy. breakable cast	16.50*
Stove plate	18.50 to 19.00
Automotive cast	20.00*

NEW YORK

Dealers' buying prices per gross ton, on cars	
No. 1 hvy. melting	\$15.33*
No. 2 hvy. melting	15.33*
Comp. black bundles	15.33*
Comp. galv. bundles	15.33*
Mach. shop turn.	10.33*
Mixed bor. & turn.	10.33*
No. 1 cupola cast	20.00*
Hvy. breakable cast	16.50*
Charging box cast	19.00*
Stove plate	19.00*
Clean auto cast	20.00*
Unstrip. motor blks.	17.50*
Cl'n chem. cast bor.	14.33*

BUFFALO

Per gross ton delivered to consumer:	
No. 1 hvy. melting	\$19.25*
No. 1 bundles	19.25*
No. 2 bundles	19.25*
No. 2 hvy. melting	19.25*
Mach. shop turn.	13.00
Shoveling turn.	15.00
Cast iron borings	14.00
Mixed bor. & turn.	13.00
No. 1 cupola cast	20.00*
Stove plate	19.00*
Low phos. plate	21.75*
Scrap rails	20.75*
Rails 3 ft. & under	22.75*
RR. steel wheels	23.75*
Cast iron car wheels	20.00*
RR. coil & leaf spgs.	23.75*
RR. knuckles & coup.	23.75*
RR. malleable	22.00*
No. 1 busheling	19.25*

CLEVELAND

Per gross ton delivered to consumer:	
No. 1 hvy. melting	\$19.50*
No. 2 hvy. melting	19.50*
Compressed sheet stl.	19.50*
Drop forge flashings	19.00*
No. 2 bundles	19.50*
Mach. shop turn.	\$12.00 to 12.50
Short shovel.	14.00 to 14.50
No. 1 busheling	19.50*
Steel axle turn.	19.00*
Low phos. billet and bloom crops	24.50*
Cast iron borings	13.00 to 13.50
Mixed bor. & turn.	12.00 to 12.50
No. 2 busheling	17.00*
No. 1 machine cast	20.00*
Railroad cast	20.00*
Railroad grate bars	15.25*
Stove plate	19.00*
RR. hvy. melting	20.50*
Rails 3 ft. & under	23.00*
Rails 18 in. & under	24.25*
Rails for rerolling	23.00*
Railroad malleable	22.00*
Elec. furnace punch	22.00*

SAN FRANCISCO

Per gross ton delivered to consumer:	
RR. hvy. melting	\$15.50 to \$16.25
No. 1 hvy. melting	15.50 to 16.25
No. 2 hvy. melting	14.50 to 15.25
No. 2 bales	13.50 to 14.25
No. 3 bales	9.50 to 10.59
Mach. shop turn.	7.00
Elec. furn. 1 ft. und.	15.50 to 17.00
No. 1 cupola cast	19.00 to 21.00

LOS ANGELES

Per gross ton delivered to consumer:	
No. 1 hvy. melting	\$14.50 to \$15.50
No. 2 hvy. melting	13.50 to 14.50
No. 2 bales	12.50 to 13.50
No. 3 bales	9.00 to 10.00
Mach. shop turn.	4.50
No. 1 cupola cast	19.00 to 21.00

SEATTLE

Per gross ton delivered to consumer:	
RR. hvy. melting	\$14.50
No. 1 hvy. melting	14.50
No. 3 bundles	11.50
Elec. furn. 1 ft. und.	17.00
No. 1 cupola cast	20.00*

Comparison of Prices . . .

[Advances Over Past Week in Heavy Type; Declines in Italics. Prices are F.O.R. Major Basing Points. The various basing points for finished and semi-finished steel are listed in the detailed price tables, pages 154-165.]

Flat Rolled Steel:	Apr. 10,	Apr. 3,	Mar. 6,	Apr. 11,
(Cents Per Lb.)	1945	1945	1945	1944
Hot rolled sheets.....	2.20	2.20	2.20	2.10
Cold rolled sheets.....	3.05	3.05	3.05	3.05
Galvanized sheets (24 ga.)	3.65	3.65	3.65	3.50
Hot rolled strip.....	2.10	2.10	2.10	2.10
Cold rolled strip.....	2.80	2.80	2.80	2.80
Plates.....	2.20	2.20	2.20	2.10
Plates, wrought iron.....	3.80	3.80	3.80	3.80
Stain's c.r. strip (No. 302)	28.00	28.00	28.00	28.00

Tin and Terne Plate:	Apr. 10,	Apr. 3,	Mar. 6,	Apr. 11,
(Dollars Per Base Box)				
Tin plate, standard cokes	\$5.00	\$5.00	\$5.00	\$5.00
Tin plate, electrolytic....	4.50	4.50	4.50	4.50
Special coated mfg. terne	4.30	4.30	4.30	4.30

Bars and Shapes:	Apr. 10,	Apr. 3,	Mar. 6,	Apr. 11,
(Cents Per Lb.)				
Merchant bars.....	2.15	2.15	2.15	2.15
Cold finished bars.....	2.65	2.65	2.65	2.65
Alloy bars.....	2.70	2.70	2.70	2.70
Structural shapes.....	2.10	2.10	2.10	2.10
Stainless bars (No. 302)	24.00	24.00	24.00	24.00
Wrought iron bars.....	4.40	4.40	4.40	4.40

Wire and Wire Products:	Apr. 10,	Apr. 3,	Mar. 6,	Apr. 11,
(Cents Per Lb.)				
Plain wire.....	2.60	2.60	2.60	2.60
Wire nails.....	2.80	2.80	2.80	2.55

Rails:	Apr. 10,	Apr. 3,	Mar. 6,	Apr. 11,
(Dollars Per Gross Ton)				
Heavy rails.....	\$43.00	\$43.00	\$43.00	\$40.00
Light rails.....	43.00	43.00	43.00	40.00

Semi-Finished Steel:	Apr. 10,	Apr. 3,	Mar. 6,	Apr. 11,
(Dollars Per Gross Ton)				
Rerolling billets.....	\$34.00	\$34.00	\$34.00	\$34.00
Sheet bars.....	34.00	34.00	34.00	34.00
Slabs, rerolling.....	34.00	34.00	34.00	34.00
Forging billets.....	40.00	40.00	40.00	40.00
Alloy blooms, billets, slabs	54.00	54.00	54.00	54.00

Wire Rods and Skelp:	Apr. 10,	Apr. 3,	Mar. 6,	Apr. 11,
(Cents Per Lb.)				
Wire rods.....	2.00	2.00	2.00	2.00
Skelp.....	1.90	1.90	1.90	1.90

Latest steel interim price increase authorized by OPA effective Jan. 11, 1945.

Composite Prices . . .

FINISHED STEEL

April 10, 1945.....	2.25839c.	Jan. 16	2.21189c.	Jan. 2
One week ago.....	2.25839c.	a Lb.	2.21189c.	a Lb.
One month ago.....	2.25839c.	a Lb.	2.21189c.	a Lb.
One year ago.....	2.27235c.	a Lb.	2.27235c.	a Lb.

HIGH	LOW	HIGH	LOW	HIGH	LOW	
1945.....	2.25839c., Jan. 16	2.21189c., Jan. 2	\$24.61, Feb. 20	\$23.61, Jan. 2	\$19.17	\$19.17
1944.....	2.30837c., Sept. 5	2.21189c., Oct. 5	\$23.61	\$23.61	19.17	19.17
1943.....	2.25513c.	2.25513c.	23.61	23.61	19.17	19.17
1942.....	2.26190c.	2.26190c.	23.61	23.61	19.17	19.17
1941.....	2.43078c.	2.43078c.	\$23.61, Mar. 20	\$23.45, Jan. 2	\$22.00, Jan. 7	\$19.17, Apr. 10
1940.....	2.30467c., Jan. 2	2.24107c., Apr. 16	23.45, Dec. 28	22.61, Jan. 2	21.83, Dec. 30	16.04, Apr. 9
1939.....	2.35367c., Jan. 3	2.26689c., May 16	22.61, Sept. 19	20.61, Sept. 12	22.50, Oct. 3	14.08, May 16
1938.....	2.58414c., Jan. 4	2.27207c., Oct. 18	23.25, June 21	19.61, July 6	15.00, Nov. 22	11.00, June 7
1937.....	2.58414c., Mar. 9	2.32263c., Jan. 4	23.25, Mar. 9	20.25, Feb. 16	21.92, Mar. 30	12.67, June 8
1936.....	2.32263c., Dec. 28	2.05200c., Mar. 10	19.74, Nov. 24	18.73, Aug. 11	17.75, Dec. 21	12.67, June 9
1935.....	2.07642c., Oct. 1	2.06492c., Jan. 8	18.84, Nov. 5	17.83, May 14	13.42, Dec. 10	10.33, Apr. 29
1934.....	2.15367c., Apr. 24	1.95757c., Jan. 2	17.90, May 1	16.90, Jan. 27	13.00, Mar. 13	9.50, Sept. 25
1933.....	1.95578c., Oct. 3	1.75836c., May 2	16.90, Dec. 5	13.56, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
1932.....	1.89196c., July 5	1.83901c., Mar. 1	14.81, Jan. 5	13.56, Dec. 6	8.50, Jan. 12	6.43, July 5
1931.....	1.99626c., Jan. 13	1.86586c., Dec. 29	15.90, Jan. 6	14.79, Dec. 15	11.33, Jan. 6	8.50, Dec. 29
1930.....	2.25488c., Jan. 7	1.97319c., Dec. 9	18.21, Jan. 7	15.90, Dec. 16	15.00, Feb. 18	11.25, Dec. 9
1929.....	2.31773c., May 28	2.26498c., Oct. 29	18.71, May 14	18.21, Dec. 17	17.58, Jan. 29	14.08, Dec. 3

Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold-rolled sheets and strip, representing 78 per cent of the United States output. Index recapitulated in Aug. 28, 1941, issue.

Pig Iron:	Apr. 10,	Apr. 3,	Mar. 6,	Apr. 11,
(Per Gross Ton)	1945	1945	1945	1944
No. 2 fdy., Philadelphia	\$26.84	\$26.84	\$26.84	\$25.84
No. 2, Valley furnace	25.00	25.00	25.00	24.00
No. 2, Southern, Cin'ti	26.11	26.11	26.11	25.11
No. 2, Birmingham	21.38	21.38	21.38	20.38
No. 2, foundry, Chicago†	25.00	25.00	25.00	24.00
Basic, del'd eastern Pa.	26.34	26.34	26.34	25.34
Basic, Valley furnace	24.50	24.50	24.50	23.50
Malleable, Chicago†	25.00	25.00	25.00	24.00
Malleable, Valley	25.00	25.00	25.00	24.00
L. S. charcoal, Chicago	37.34	37.34	37.34	37.34
Ferromanganese†	135.00	135.00	135.00	135.00

† The switching charge for delivery to foundries in the Chicago district is 60c. per ton.

† For carlots at seaboard.

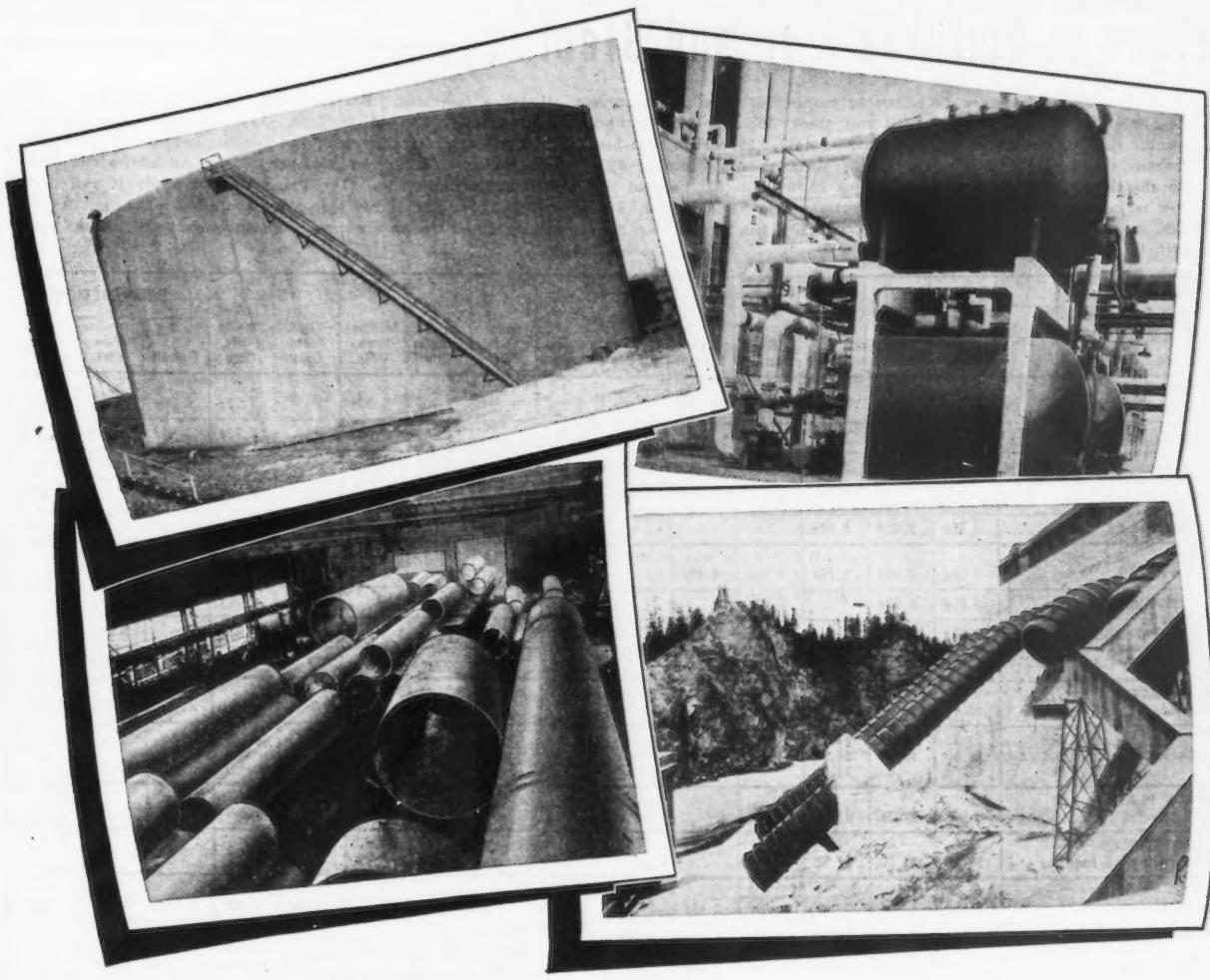
Last pig iron price change authorized by OPA effective Feb. 14, 1945.

Coke, Connellsville:	Apr. 10,	Apr. 3,	Mar. 6,	Apr. 11,
(Per Net Ton at Oven)				
Furnace coke, prompt...	\$7.00	\$7.00	\$7.00	\$7.00
Foundry coke, prompt...	8.25	8.25	8.25	8.25

Non-Ferrous Metals:	Apr. 10,	Apr. 3,	Mar. 6,	Apr. 11,
(Cents Per Lb. to Large Buyers)				
Copper, electro., Conn.	12.00	12.00	12.00	12.00
Copper, Lake	12.00	12.00	12.00	12.00
Tin (Straits), New York	52.00	52.00	52.00	52.00
Zinc, East St. Louis	8.25	8.25	8.25	8.25
Lead, St. Louis	6.35	6.35	6.35	6.35
Aluminum, Virgin., del'd.	15.00	15.00	15.00	15.00
Nickel, electrolytic	35.00	35.00	35.00	35.00
Magnesium, ingot	20.50	20.50	20.50	20.50
Antimony, Laredo, Tex.	14.50	14.50	14.50	14.50

PIG IRON	SCRAP STEEL
....\$24.61 a Gross Ton.....	\$19.17 a Gross Ton.....
....\$24.61 a Gross Ton.....	\$19.17 a Gross Ton.....
....\$24.61 a Gross Ton.....	\$19.17 a Gross Ton.....
....\$23.61 a Gross Ton.....	\$19.17 a Gross Ton.....

HIGH	LOW	HIGH	LOW	HIGH	LOW
\$22.00, Jan. 7	\$19.17, Apr. 10	\$22.00, Jan. 7	\$19.17, Apr. 10	\$22.00, Jan. 7	\$19.17, Apr. 10
21.83, Dec. 30	16.04, Apr. 9	21.83, Dec. 30	16.04, Apr. 9	21.83, Dec. 30	16.04, Apr. 9
22.50, Oct. 3	14.08, May 16	22.50, Oct. 3	14.08, May 16	22.50, Oct. 3	14.08, May 16
15.00, Nov. 22	11.00, June 7	15.00, Nov. 22	11.00, June 7	15.00, Nov. 22	11.00, June 7
21.92, Mar. 30	12.67, June 8	21.92, Mar. 30	12.67, June 8	21.92, Mar. 30	12.67, June 8
17.75, Dec. 21	12.67, June 9	17.75, Dec. 21	12.67, June 9	17.75, Dec. 21	12.67, June 9
13.42, Dec. 10	10.33, Apr. 29	13.42, Dec. 10	10.33, Apr. 29	13.42, Dec. 10	10.33, Apr. 29
13.00, Mar. 13	9.50, Sept. 25	13.00, Mar. 13	9.50, Sept. 25	13.00, Mar. 13	9.50, Sept. 25
12.25, Aug. 8	6.75, Jan. 3	12.25, Aug. 8	6.75, Jan. 3	12.25, Aug. 8	6.75, Jan. 3
8.50, Jan. 12	6.43, July 5	8.50, Jan. 12	6.43, July 5	8.50, Jan. 12	6.43, July 5
11.33, Jan. 6	8.50, Dec. 29	11.33, Jan. 6	8.50, Dec. 29	11.33, Jan. 6	8.50, Dec. 29
15.0					



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Standpipes
Oil Storage Tanks
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Prices of Finished Iron and Steel . . .

Steel prices shown here are f.o.b. basing points, in cents per lb. unless otherwise indicated. Extras apply. Delivered prices do not reflect 3% tax on freight. (1) Mill run sheet, 10c. per 100 lb. under base; primes, 25c. above base. (2) Unassorted commercial coating. (3) Widths up to 12-in. inclusive. (4) 0.25 carbon and less. (5) Applies to certain width and length limitations. (6) For merchant trade. (7) For straight length material only from producer to consumer. Discount of 25c. per 100 lb. to fabricators. (8) Also shafting. For quantities of 20,000 to 29,999 lb. (9) Carload lot in manufacturing trade. (10) Prices do not apply if rail and water is not used. (12) Boxed. (13) Portland and Seattle price, San Francisco 2.50c. (14) This base price for annealed, bright finish wires, commercial spring wire. (15) Deduct 10c. per 100 lb. for plates not produced to sheared mill or universal mill width and length tolerances.

Basing Point ↓ Product	DELIVERED TO													
	Pitts- burgh	Chicago	Gary	Cleve- land	Birm- ingham	Buffalo	Youngs- town	Spar- rows Point	Granite City	Middle- town, Ohio	Gulf Ports, Cars	10 Pacific Ports, Cars	Detroit	New York	Phil- adelphi-a
 SHEETS														
Hot rolled	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢	2.30¢	2.20¢	2.75¢	2.30¢	2.44¢	2.37¢
Cold rolled ¹	3.05¢	3.05¢	3.05¢	3.05¢			3.05¢	3.05¢	3.15¢	3.05¢	3.70¢	3.15¢	3.39¢	3.37¢
Galvanized (24 gage)	3.65¢	3.65¢	3.65¢		3.65¢	3.65¢	3.65¢	3.65¢	3.75¢	3.65¢	4.20¢		3.89¢	3.86¢
Enameling (20 gage)	3.35¢	3.35¢	3.35¢	3.35¢				3.35¢	3.45¢	3.35¢	4.00¢	3.45¢	3.71¢	3.67¢
Long ternes ²	3.80¢	3.80¢	3.80¢								4.55¢		4.16¢	4.12¢
 STRIP														
Hot rolled ³	2.10¢	2.10¢	2.10¢	2.10¢	2.10¢		2.10¢			2.10¢	2.75¢	2.20¢	2.46¢	
Cold rolled ⁴	2.80¢	2.90¢	—	2.80¢			2.80¢	(Worcester=3.00¢)				2.90¢	3.16¢	
Cooperage stock	2.20¢	2.20¢			2.20¢		2.20¢						2.56¢	
Commodity C-R	2.95¢	3.05¢		2.95¢			2.95¢	(Worcester=3.35¢)				3.05¢	3.31¢	
 TIN PLATE														
Standard coates, base box	\$5.00	\$5.00	\$5.00						\$5.10				5.38¢	5.32¢
Electro, box ⁵ 0.25 lb. 0.50 lb. 0.75 lb.	\$4.35 \$4.50 \$4.65	\$4.35 \$4.50 \$4.65	\$4.35 \$4.50 \$4.65						\$4.60 \$4.75					
 BLACK PLATE														
29 gage ⁶	3.05¢	3.05¢	3.05¢						3.15¢		4.05¢ ¹²		3.37¢	
 TERNES, MFG.														
Special coated, base box	\$4.30	\$4.30	\$4.30						\$4.40					
 BARS														
Carbon steel	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		(Duluth=2.25¢)		2.50¢	2.80¢	2.25¢	2.49¢	2.47¢
Rail steel ⁶	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢				2.50¢	2.80¢			
Reinforcing (billet) ⁷	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		2.50¢	2.55 ¹³	2.25¢	2.39¢	
Reinforcing (rail) ⁷	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢	2.15¢		2.50¢	2.55 ¹³	2.25¢		2.47¢
Cold finished ⁸	2.65¢	2.65¢	2.65¢	2.65¢		2.65¢			(Detroit=2.70¢)	(Toledo=2.80¢)			2.99¢	2.97¢
Alloy, hot rolled	2.70¢	2.70¢				2.70¢	(Bethlehem, Massillon, Canton=2.70¢)				2.80¢			
Alloy, cold drawn	3.35¢	3.35¢	3.35¢	3.35¢		3.35¢					3.45¢			
 PLATES														
Carbon steel ¹⁸	2.20¢	2.20¢	2.20¢	2.20¢	2.20¢		2.20¢	2.20¢	2.45¢	2.55¢	2.75¢	2.42¢	2.39¢	2.25¢
Floor plates	3.35¢	3.35¢								3.70¢	4.00¢		3.71¢	3.67¢
Alloy	3.50¢	3.50¢			(Coatesville=3.50¢)					3.95¢	4.15¢	3.70¢	3.59¢	
 SHAPES														
Structural	2.10¢	2.10¢	2.10¢			2.10¢	2.10¢	(Bethlehem=2.10¢)		2.45¢	2.75¢		2.27¢	2.215¢
 SPRING STEEL, C-R														
0.26 to 0.50 Carbon	2.80¢				2.80¢			(Worcester=3.00¢)						
0.51 to 0.75 Carbon	4.30¢				4.30¢			(Worcester=4.50¢)						
0.75 to 1.00 Carbon	6.15¢				6.15¢			(Worcester=6.35¢)						
1.01 to 1.25 Carbon	8.35¢				8.35¢			(Worcester=8.55¢)						
 WIRE ⁹														
Bright ¹⁴	2.60¢	2.60¢			2.60¢	2.60¢		(Worcester=2.70¢)	(Duluth=2.85¢)	3.10¢			2.92¢	
Galvanized								Add proper size extra and galvanizing extra to Bright Wire base						
Spring (High Carbon)	3.20¢	3.20¢			3.20¢			(Worcester=3.30¢)		3.70¢			3.52¢	
 PILING														
Steel Sheet	2.40¢	2.40¢					2.40¢				2.95¢		2.72¢	

EXCEPTIONS TO PRICE SCHED. NO. 6.

Slabs, per gross ton—Andrews Steel Co. \$41 basing pts.; Wheeling Steel Corp. (rerolling) 4 in. sq. or larger \$37.75 f.o.b. Portsmouth; Kaiser Co. (rerolling) \$58.64, (forging) \$64.64, (shell steel) \$74.64, f.o.b. Los Angeles.

Blooms, per gross ton—Phoenix Iron Co. (rerolling) \$41; (forging) \$47; Pgh. Steel Co. (rerolling) \$38.25, (forging) \$44.25; Wheeling

Steel Corp. (rerolling) 4 in. sq. or larger \$37.75 f.o.b. Portsmouth; Kaiser Co. (rerolling) \$58.64, (forging) \$64.64, (shell steel) \$74.64 f.o.b. Los Angeles.

Sheet Bar, per gross ton—Empire Sheet & Tin Plate Co. \$39 mill; Wheeling Steel Corp. \$38 Portsmouth, Ohio.

Billets, Forging, per gross ton—Andrews Steel Co. \$50 basing pts.; Follansbee Steel Corp. \$49.50 Toronto, Ohio; Phoenix Iron Co. \$47 mill; Geneva Steel Co. \$64.64 f.o.b. Pacific Coast; Pittsburgh Steel Co. \$49.50; Kaiser Co. \$58.64, (forging) \$64.64, f.o.b. Los Angeles.

Co. \$64.64, (shell steel) \$74.64, f.o.b. Los Angeles.

Billets, Rerolling, per gross ton—Continental Steel Corp. may charge Acme Steel in Chicago switching area \$34 plus freight from Kokomo, Ind.; Northwestern Steel & Wire Co. (Lend-Lease) \$41 mill; Wheeling Steel Corp. 4 in. sq. or larger \$37.75, smaller \$39.50 f.o.b. Portsmouth, Ohio; Stanley Works may sell Washburn Wire Co. under allocation at \$39 Bridgeport, Conn.; Keystone Steel & Wire Co. may sell Acme Steel Co. at Chicago base, f.o.b. Peoria; Phoenix Iron Co. \$41 mill; Continen-

tal Steel Co. \$40.50 Kokomo, Ind.; extra \$36.40 Peoria; Birmingham; Mich.; Gen. Coast; W. Va.; Pueblo.

Rails, per ton
steel) \$60 weight
W. Va.; Pueblo.

Hot Rolled
2.85c. mill
Kaiser
Pacific, Po.
2.50c. basic
2.35c. Gran-

Merchant
over,
basing pts.
Co. 2.40c.
2.33c.
2.35c. Chi-
Warren Co.
Knoxville
Iled Steel
Chicago b.
Mfg. Co.,

Pipe Skelg.
2.05c.
Reinforcing
and over,
steel), 2.38
Pacific Po.

Cold Finis.
Co. on all
c/l freight
Spring Cit.
Co. on all
falo c/f.
Mansfield,
Finished
New Eng.
freight Bu.
pressed St.
side New
freight B.
Readville;
cago c/f.
Louis, I.o.

Alloy Bars
cept Texa.
Fort Worth
outside Al.
Florida, T.
mber.
Hot Rolled
town base
Parkersburg.

Galvanized
basing pt.
2.35c. Pa.
basing pt.
town base
Sheet Ste.
Lend-Leas.

Pipe and
when pri-
Coast and
Chester, A.
Harrisbur.

Black She
maximum
with diffe
provided

Wire Pro
Pittsburgh
In., 2.20c
bright wi
and fur
sealed w
3.90c.; pl
0.66c.; br
spring wi

PRICES

tal Steel Corp. (1% x 1%) \$39.50, (2 x 2) \$40.60 Kokomo, Ind. (these prices include \$1 size extra); Keystone Steel & Wire Co. \$36.40 Peoria; Connor Steel Co. \$50.60 Birmingham; Ford Motor Co. \$34 Dearborn, Mich.; Geneva Steel Co. \$58.64 f.o.b. Pacific Coast; Pgh. Steel Co. \$43.50; Kaiser Co. \$58.64 f.o.b. Los Angeles.

Structural Shapes—Phoenix Iron Co. 2.35c. basing pts. (export) 2.50c. Phoenixville; Knoxville Iron Co. 2.30c. basing points; Kaiser Co. 3.20c. f.o.b. Los Angeles.

Rails, per gross ton—Sweet Steel Co. (rail steel) \$50 mill; West Virginia Rail Co. (light-weight) on allocation based Huntington, W. Va.; Colorado Fuel & Iron Corp., \$45 Pueblo.

Hot Rolled Plate—Granite City Steel Co. 2.85c. mill; Knoxville Iron Co. 2.25c. basing pts.; Kaiser Co. and Geneva Steel Co. 3.20c. Pacific Ports; Central Iron and Steel Co. 2.50c. basing points; Granite City Steel Co. 2.35c. Granite City.

Merchant Bars—W. Ames Co., 10 tons and over, 2.85c. mill; Eckels-Nye Steel Corp. 2.50c. basing pts. (rail steel) 2.40c.; Phoenix Iron Co. 2.40c. basing pts.; Sweet Steel Co. (rail steel) 2.33c. mill; Joslyn Mfg. & Supply Co. 2.35c. Chicago; Calumet Steel Div., Borg Warner Corp. (8 in. mill bar), 2.35c. Chicago; Knoxville Iron Co., 2.30c. basing pts.; Laclede Steel Co., sales to LaSalle Steel granted Chicago base, f.o.b. Madison, Ill.; Milton Mfg. Co. 2.75c. f.o.b. Milton, Pa.

Pipe Skelp—Wheeling Steel Corp., Benwood, 2.05c.

Reinforcing Bars—W. Ames & Co., 10 tons and over, 2.85c. mill; Sweet Steel Co. (rail steel), 2.33c. mill; Columbia Steel Co., 2.50c. Pacific Ports.

Cold Finished Bars—Keystone Drawn Steel Co. on allocation, Pittsburgh c.f. base plus c/l freight on hot rolled bars Pittsburgh to Spring City, Pa.; New England Drawn Steel Co. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to Mansfield, Mass., f.o.b. Mansfield; Empire Finishing Steel Corp. on allocation outside New England, Buffalo c.f. base plus c/l freight Buffalo to plants, f.o.b. plant; Compressed Steel Shafting Co. on allocation outside New England, Buffalo base plus c/l freight Buffalo to Readville, Mass., f.o.b. Readville; Medart Co. in certain areas, Chicago c.f. base plus c/l freight Chicago to St. Louis, f.o.b. St. Louis.

Alloy Bars—Texas Steel Co., for delivery except Texas and Okla., Chicago base, f.o.b. Fort Worth, Tex.; Connor Steel Co., shipped outside Ala., Mississippi, Louisiana, Georgia, Florida, Tenn., Pittsburgh base, f.o.b. Birmingham.

Hot Rolled Strip—Joslyn Mfg. & Supply Co., 2.80c. Chicago; Knoxville Iron Co., 2.25c. basing pts.

Hot Rolled Sheets—Andrews Steel Co., Middle-town base on shipments to Detroit or area; Parkersburg Iron & Steel Co., 2.25c. Parkersburg.

Galvanized Sheets—Andrews Steel Co. 3.75c. basing pts.; Parkersburg Iron & Steel Co. 3.85c. Parkersburg; Apollo Steel Co., 3.75c. basing pts.; Continental Steel Co., Middle-town base on Kokomo, Ind., product; Superior Sheet Steel Co., Pittsburgh base except for Lend-Lease.

Pipe and Tubing—South Chester Tube Co. when priced at Pittsburgh, freight to Gulf Coast and Pacific Ports may be charged from Chester, Pa., also to points lying west of Harrisburg, Pa.

Black Sheets—Empire Sheet and Tinplate Co., maximum base price mill is 2.45c. per 100 lb., with differentials, transportation charges, etc., provided in RPS. No. 6.

Wire Products—Pittsburgh Steel Co., f.o.b. Pittsburgh, per 100 lb., rods, No. 5 to 9/32 in., 2.20c.; rods, heavier than 9/32, 2.85c.; bright wire, 2.725c.; bright nails, 2.90c.; lead and furnace annealed wire, 2.85c.; pot annealed wire, 2.85c.; galvanized barbed wire, 1.90c.; plain staples, 2.55c.; galvanized staples, 2.65c.; bright spring wire, 3.50c.; galvanized spring wire, 3.45c.

FOR ALL TYPES of INDUSTRIAL FURNACES

... using higher pressure gas



AIROCOOL GAS BURNERS

Airocool gas burners are of the venturi inspirating or atmospheric type suitable for use where gas is supplied at higher pressures.

Made, as shown, in sizes 4", 5", 6" and 8". Also, in a slightly different model for sizes 1" to 3".

All can be furnished with our patented flame stabilizing nozzle having an integral gas pilot and refractory protected face. Airocool nozzles have long life and give a high turn down ratio without "burning back" in the venturi.

Airocool gas burners and nozzles are extensively used for the generation of steam and for process heating. Write for further information.

Another National Airoil Burner



NATIONAL AIROIL BURNER COMPANY, INCORPORATED

1271 East Sedgley Ave., Philadelphia 34, Pa.
ESTABLISHED 1912
INCORPORATED 1917

**NATIONAL
AIROIL
FUEL OIL-GAS
BURNERS**

Steam Atomizing Oil Burners—Mechanical Pressure Atomizing Oil Burners—Low Air Pressure Oil Burners—Motor-driven Rotary Oil Burners—Industrial Gas Burners—Combination Gas and Oil Burners—Fuel Oil Pumping Units—Fuel Oil Heaters—Fuel Oil Strainers and other accessories.

MACHINED BRONZE BEARINGS GRAPHITED AND OILLESS BRONZE BEARINGS BRONZE GEAR BLANKS MACHINED BRONZE PARTS

S & H Bronze Bearings are made of cast bronze, under the most modern conditions and of specifications to meet the most exacting requirements. We are manufacturers of plain bronze and graphited and oilless bronze bearings for all branches of the Government Services, as well as plain cylinder type, single and double flange, thrust washers, from $\frac{1}{8}$ " in diameter to 20" in diameter. We also manufacture special parts made of cast bronze. Our manufacturing methods and equipment enable us to meet the most exacting machining specifications.

If it's Bronze

INDUSTRIAL



We make it

BEARINGS

S. & H. Bearing and Manufacturing Co.

340-344 North Avenue, East

Cranford

New Jersey

PRICES

WAREHOUSE PRICES

Delivered metropolitan areas per 100 lb. These are zoned warehouse prices in conformance with latest zoning amendment to OPA Price Schedule #9.

Cities	SHEETS			STRIP		Plates 1/4 in. and heavier	Structural Shapes	BARS		ALLOY BARS			
	Hot Rolled (10 gage)	Cold Rolled	Galvanized (24 gage)	Hot Rolled	Cold Rolled			Hot Rolled	Cold Finished	Hot Rolled, NE 9442-45 Ann.	Hot Rolled, NE 9442-45 Ann.	Cold Drawn, NE 9442-45 Ann.	Cold Drawn, NE 9442-45 Ann.
**Philadelphia.....	\$3.618	\$4.872*	\$5.168a	\$3.822	\$4.772	\$3.705	\$3.666	\$3.822	\$4.072	\$5.966	\$7.066	\$7.272	\$8.322
New York.....	3.690	4.613*	5.160	3.974*	4.772	3.868	3.758	3.853	4.103	5.858	6.908	7.103	8.203
Boston.....	3.844	4.744*	5.374*	4.108	4.715	4.012	3.912	4.044	4.144	6.162	7.262	7.344	8.394
Baltimore.....	3.494	4.852	5.044	3.902	4.752	3.694	3.759	3.802	4.052	4.185	.....	.....	.....
Norfolk.....	3.871	4.965	5.521	4.185	4.865	4.071	4.002	4.065	4.185	4.185	.....	.....	.....
Chicago.....	3.35	4.20	5.381	3.80	4.851	3.65	3.55	3.50	3.75	5.75	6.85	6.85	7.90
Milwaukee.....	3.487	4.337*	5.422	3.737	4.78717	3.787	3.687	3.637	3.887	5.987	7.087	7.087	8.137
Cleveland.....	3.45	4.40	5.0274	3.80	4.45	3.50	3.588	3.35	3.75	5.356	7.056	6.85	7.90
Buffalo.....	3.45	4.40	4.904	3.819	4.689	3.73	3.40	3.35	3.75	5.75	6.85	6.85	7.90
Detroit.....	3.55	4.50	5.154	3.70	4.88917	3.708	3.681	3.45	3.80	6.08	7.18	7.159	8.209
Cincinnati.....	3.525	4.475*	4.975	3.675	4.711	3.711	3.691	3.611	4.011	4.32	.....	.....	.....
St. Louis.....	3.497	4.347*	5.322	3.747	4.93117	3.797	3.687	3.647	4.031	6.131	7.231	7.231	8.281
Pittsburgh.....	3.45	4.40	4.90	3.80	4.45	3.50	3.40	3.35	3.75	5.75	6.85	6.85	7.90
St. Paul.....	3.61	4.48	5.4074	3.88	4.3517	3.9113	3.8113	3.7613	4.361	6.09	7.19	7.561	8.711
Omaha.....	3.965	5.443	5.7584	4.215	.....	4.265	4.185	4.115	4.43	.....	.....	.....	.....
Indianapolis.....	3.68	3.58	4.718	4.918	3.768	4.88	3.63	3.58	3.98	8.08	7.18	7.18	8.23
Birmingham.....	3.55	.....	4.90	3.70	.....	3.65	3.55	3.50	4.43	.....	.....	.....	.....
Memphis.....	4.0657	4.88	3.415	4.215	.....	4.185	4.065	4.015	4.32	.....	.....	.....	.....
New Orleans.....	4.158*	4.95	5.508	4.308	.....	4.258	4.188*	4.108*	4.629	.....	.....	.....	.....
Houston.....	3.863	5.573	5.4631	4.313	.....	4.35	4.25	3.75	6.373*	7.223	8.323	8.323	8.373
Los Angeles.....	5.10	7.20*	6.254	4.98	5.61315	5.05	4.65	4.40	5.583	8.304	9.404	9.404	10.454
San Francisco.....	4.6514	7.304	6.504	4.5014	7.33317	4.7514	4.3514	4.1514	5.333	8.304	9.404	9.404	10.454
Seattle.....	4.7512	7.05*	6.104	4.2812	.....	4.8512	4.4512	4.3512	5.783	.....	.....	.....	.....
Portland.....	4.7511	6.904	5.904	4.7511	.....	4.8511	4.4511	4.4511	5.533	8.304	9.404	8.304	9.404
Salt Lake City.....	4.6317	.....	6.3218	5.5317	.....	5.0817	4.9817	4.8817	5.90	.....	.....	.....	.....

National Emergency Steels

MILL EXTRAS

Designa- tion	Basic Open-Hearth		Electric Furnace		Designa- tion	Basic Open-Hearth		Electric Furnace		Bars and Bar-Strip	Billets, Blooms, and Slabs	Bars and Bar-Strip	Billets, Blooms, and Slabs
	Bars and Bar-Strip	Billets, Blooms, and Slabs	Bars and Bar-Strip	Billets, Blooms, and Slabs		Bars and Bar-Strip	Billets, Blooms, and Slabs	Bars and Bar-Strip	Billets, Blooms, and Slabs				
NE 8612	0.65*	\$13.00	\$1.15	\$23.00	NE 9427	0.75*	\$15.00	\$1.25	\$25.00	.....	.....	.....	.....
NE 8615	0.65	13.00	1.15	23.00	NE 9430	0.75	15.00	1.25	25.00	.....	.....	.....	.....
NE 8617	0.65	13.00	1.15	23.00	NE 9432	0.75	15.00	1.25	25.00	.....	.....	.....	.....
NE 8620	0.65	13.00	1.15	23.00	NE 9435	0.75	15.00	1.25	25.00	.....	.....	.....	.....
NE 8622	0.65	13.00	1.15	23.00	NE 9437	0.75	15.00	1.25	25.00	.....	.....	.....	.....
NE 8625	0.65	13.00	1.15	23.00	NE 9440	0.75	15.00	1.25	25.00	.....	.....	.....	.....
NE 8627	0.65	13.00	1.15	23.00	NE 9442	0.80	16.00	1.30	26.00	.....	.....	.....	.....
NE 8630	0.65	13.00	1.15	23.00	NE 9445	0.80	16.00	1.30	26.00	.....	.....	.....	.....
NE 8632	0.65	13.00	1.15	23.00	NE 9447	0.80	16.00	1.30	26.00	.....	.....	.....	.....
NE 8635	0.65	13.00	1.15	23.00	NE 9450	0.80	16.00	1.30	26.00	.....	.....	.....	.....
NE 8637	0.65	13.00	1.15	23.00	NE 9452	0.80	16.00	1.30	26.00	.....	.....	.....	.....
NE 8640	0.65	13.00	1.15	23.00	NE 9454	0.80	16.00	1.30	26.00	.....	.....	.....	.....
NE 8642	0.65	13.00	1.15	23.00	NE 9722	0.85	13.00	1.15	23.00	.....	.....	.....	.....
NE 8645	0.65	13.00	1.15	23.00	NE 9727	0.85	13.00	1.15	23.00	.....	.....	.....	.....
NE 8647	0.65	13.00	1.15	23.00	NE 9732	0.85	13.00	1.15	23.00	.....	.....	.....	.....
NE 8650	0.65	13.00	1.15	23.00	NE 9737	0.85	13.00	1.15	23.00	.....	.....	.....	.....
NE 8712	0.70	14.00	1.20	24.00	NE 9747	0.85	13.00	1.15	23.00	.....	.....	.....	.....
NE 8715	0.70	14.00	1.20	24.00	NE 9750	0.85	13.00	1.15	23.00	.....	.....	.....	.....
NE 8717	0.70	14.00	1.20	24.00	NE 9763	0.85	13.00	1.15	23.00	.....	.....	.....	.....
NE 8720	0.70	14.00	1.20	24.00	NE 9768	0.85	13.00	1.15	23.00	.....	.....	.....	.....
NE 8722	0.70	14.00	1.20	24.00	NE 9775	0.85	13.00	1.15	23.00	.....	.....	.....	.....
NE 8725	0.70	14.00	1.20	24.00	NE 9830	1.20	26.00	1.80	26.00	.....	.....	.....	.....
NE 8727	0.70	14.00	1.20	24.00	NE 9832	1.20	26.00	1.80	26.00	.....	.....	.....	.....
NE 8730	0.70	14.00	1.20	24.00	NE 9835	1.20	26.00	1.80	26.00	.....	.....	.....	.....
NE 8732	0.70	14.00	1.20	24.00	NE 9837	1.20	26.00	1.80	26.00	.....	.....	.....	.....
NE 8735	0.70	14.00	1.20	24.00	NE 9840	1.20	26.00	1.80	26.00	.....	.....	.....	.....
NE 8737	0.70	14.00	1.20	24.00	NE 9842	1.20	26.00	1.80	26.00	.....	.....	.....	.....
NE 8740	0.70	14.00	1.20	24.00	NE 9845	1.20	26.00	1.80	26.00	.....	.....	.....	.....
NE 8742	0.70	14.00	1.20	24.00	NE 9847	1.20	26.00	1.80	26.00	.....	.....	.....	.....
NE 8745	0.70	14.00	1.20	24.00	NE 9850	1.20	26.00	1.80	26.00	.....	.....	.....	.....
NE 8747	0.70	14.00	1.20	24.00	NE 9912	1.20	24.00	1.85	31.00	.....	.....	.....	.....
NE 8750	0.70	14.00	1.20	24.00	NE 9915	1.20	24.00	1.85	31.00	.....	.....	.....	.....
NE 9415	0.75	15.00	1.25	25.00	NE 9917	1.20	24.00	1.85	31.00	.....	.....	.....	.....
NE 9417	0.75	15.00	1.25	25.00	NE 9920	1.20	24.00	1.85	31.00	.....	.....	.....	.....
NE 9420	0.75	15.00	1.25	25.00	NE 9922	1.20	24.00	1.85	31.00	.....	.....	.....	.....
NE 9422	0.75	15.00	1.25	25.00	NE 9925	1.20	24.00	1.85	31.00	.....	.....	.....	.....
NE 9425	0.75	15.00	1.25	25.00	NE 9927	1.20	24.00	1.85	31.00	.....	.....	.....	.....

Note 1: The ranges shown are restricted to sizes 100 sq. in. or less or equivalent cross-sectional area 18 in. wide or under, with a maximum individual piece weight of 7000 lb. irrespective of size. Note 2: For steels ordered to such ranges, below the size and weight restriction, the average of all the chemical checks must be within the limits specified subject to check analysis variations given in Table 4, Section 10, AISI Steel Products Manual. Note 3: When acid open-hearth is specified and acceptable, add to basic open-hearth alloy differential 0.25c. per lb. for bars and bar strip and \$5 per gross ton for billets, blooms and slabs. Note 4: The extras shown are in addition to the base price of \$2.70 for 100 lb. on finished products and \$54 per gross ton on semi-finished steel, major basing points, and are in cents per pound when applicable to bars and bar-strip and in dollars per gross ton when applicable to billets, blooms and slabs. The full extra applicable over the base price is the total of all extras indicated by the specific requirements of the order. The higher extra shall be charged for any size falling between two published extras.

LAKE SUPERIOR ORES

Effective CaF ₂ Content:	Base price per short ton
70% or more	\$33.00
65% but less than 70%	32.00
60% but less than 65%	31.00
Less than 60%	30.00



LARGER CAPACITY

P & H

SQUARE FRAME WELDER WITH WSR (WELDING SERVICE RANGE) FROM 60 TO 375 AMPERES

Built in response to popular demand, this new machine incorporates all the advantages of P&H's unique Square-Frame design. Here's simple construction, with but two major parts . . . parallel operation, (with dual mounting of machines you can handle higher amperage needs) . . . single control for any desired welding heat . . . "Visi-matic" calibration which enables you to select, instantly, the right current for each of the three classes of electrodes—high, medium, or low voltage.

Now — these added features:

- POLARITY REVERSING SWITCH
- REMOVABLE STATOR—for easier inspection and servicing
- CONTACT OVERLOAD PROTECTION
- MAGNETIC STARTER—with low voltage and overload protection
- WEATHER-PROOF CONSTRUCTION

P & H's Square Frame design—proved by over 70 million production hours—assures you of reliable operation for many years to come. And WSR (Welding Service Range) ratings give you the actual usable welding current the machine will deliver from minimum to maximum.

Write for your copy of Bulletin W-59.

General Offices: 4401 W. National Ave., Milwaukee 14, Wis.

A COMPLETE ARC WELDING SERVICE



AC WELDERS



WELDING ELECTRODES



WELDING POSITIONERS



WELDING PRODUCTION
CONTROL SYSTEMS



ELECTRIC HOISTS



PRICES

SEMI-FINISHED STEEL

Ingots, Carbon, Rerolling

Base per gross ton, f.o.b. mill... \$31.00
Exceptions: Phoenix Iron Co. may charge \$38.75; Kaiser Co., \$43.00 f.o.b. Pacific Coast ports; Empire Sheet & Tinplate Co., \$34.25; Pgh. Steel Co., \$33.10.

Ingots, Carbon, Forging

Base per gross ton, f.o.b. Birmingham, Buffalo, Chicago, Cleveland, Gary, Pittsburgh, Youngstown... \$36.00
Exceptions: Phoenix Iron Co. may charge \$43.00; Empire Sheet & Tinplate Co., \$39.25, f.o.b. Mansfield, Ohio; West Coast producers, \$48.00, f.o.b. Pacific Coast Ports; Pgh. Steel Co., \$38.10.

Ingots, Alloy

Base per gross ton, f.o.b. Bethlehem, Buffalo, Canton, Coatesville, Chicago, Massillon, Pittsburgh... \$45.00
Exceptions: C/L delivered Detroit add \$2.00; delivered East Michigan add \$3.00; Connors Steel Co. may charge \$45.00 f.o.b. Birmingham.

Billets, Blooms and Slabs

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Buffalo, Birmingham, Sparrows Point (rerolling only). Prices delivered Detroit are \$2.00 higher; delivered E. Michigan, \$3 higher; f.o.b. Duluth, billets only, \$2.00 higher; billets f.o.b. Pacific ports are \$12 higher. Provo, \$11.20 higher. Delivered prices do not reflect three per cent tax on freight rates.

Per Gross Ton

Rerolling \$34.00
Forging quality 40.00
For exceptions on semi-finished steel see the footnote on the page of finished steel prices.

Alloy Billets, Blooms, Slabs

Pittsburgh, Chicago, Canton, Massillon, Buffalo or Bethlehem, per gross ton \$54.00
Price delivered Detroit \$2.00 higher; East Michigan, \$3.00 higher.

Shell Steel

Per Gross Ton

3 in. to 12 in. \$52.00
12 in. to 18 in. 54.00
18 in. and over 56.00
Basic open hearth shell steel, f.o.b. Pittsburgh, Chicago, Buffalo, Gary, Cleveland, Youngstown and Birmingham.

Prices delivered Detroit are \$2.00 higher; East Michigan, \$3 higher.

Price Exceptions: Follansbee Steel Corp. permitted to sell at \$13.00 per gross ton, f.o.b. Toronto, Ohio, above base price of \$52.00.

Note: The above base prices apply on lots of 1000 tons of a size and section to which are to be added extras for chemical requirements, cutting, or quantity.

Sheet Bars

Pittsburgh, Chicago, Cleveland, Youngstown, Buffalo, Canton, Sparrows Point.

Per Gross Ton

Open hearth or bessemer \$34.00

Skelp

Pittsburgh, Chicago, Youngstown, Coatesville, Pa., Sparrows Point, Md.

Per Lb.

Grooved, universal and sheared .. 1.90c.

Wire Rods

(No. 5 to 9/32 in.)

Per Lb.

Pittsburgh, Chicago, Cleveland ... 2.00c.
Worcester, Mass. 2.10c.
Birmingham 2.00c.
San Francisco 2.50c.
Galveston 2.25c.

9/32 in. to 47/64 in., 0.15c. a lb. higher.

Quantity extras apply.

TOOL STEEL

(F.o.b. Pittsburgh, Bethlehem, Syracuse)

Base per lb.

High speed	67c.
Straight molybdenum	54c.
Tungsten-molybdenum	57 1/4c.
High-carbon-chromium	43c.
Oil hardening	24c.
Special carbon	22c.
Extra carbon	18c.
Regular carbon	14c.

Warehouse prices east of Mississippi are 2c. a lb. higher; west of Mississippi 3c. higher.



Where can the BRANDT Fabricating Facilities Fit Your Postwar Production?

Your postwar production will probably include some fabrication to be done by a reliable, experienced metal-working organization. That's where Brandt of Baltimore can fill a definite need!

For over fifty years Brandt has fabricated metals for scores of industrial uses. Present products range from small formed units of only a few ounces to huge fabricated assemblies weighing up to 30 tons.

The Brandt 8½-acre plant houses complete, modern equipment for shearing, rolling, forming and welding. Machine capacities range from the lightest gauge sheet up to and including 1¼" mild steel or ¾" armor plate. All metals, ferrous, non-ferrous and alloy, can be completely fabricated to your specifications.

And if you've hit a snag on your postwar product, our designers and engineers will welcome the opportunity to assist in planning the details and specifications. Naturally all plans will be held in strict confidence. So if there are fabrication or design problems in your postwar plans, we invite you to discuss them with

BRANDT of Baltimore

Charles T. Brandt, Inc., 1716 Ridgely Street
Baltimore 30, Maryland



BRANDT of Baltimore • Craftsmen in Metal Since 1890

HOW TO AVOID TOO MUCH DRESSING!

... the Fast Cool-Grinding
Cortland Way

Continual need for dressing in flat grinding operations usually means that the grinding segments are not of the right specifications. For instance:

In another Cortland War Production test, in the plant of a gun maker, against a competitive product, Cortland Chucks and Segments cut the number of dressings required more than two-thirds . . . and reduced the grinding time. Here are the facts:

MACHINE: Blanchard Vertical Surface Grinder, #16.

WORK: Gun slide.

Rate of Feed .001"; Table Speed 29 R.P.M.



DETAIL	CORTLAND Chuck and Segments	Competitive Brand of Chuck and Segments
Table Load	31 pieces	20 pieces
Ampere readings	70 - 80	70 - 100
Dressings necessary	Av. 3	6 - 12
Work heat	No	Yes
Grinding time	1 min., 40 sec.	6 - 9 min.

Cortland Chucks and *Diagonal Shearing* Segments can usually speed your grinding operations, and give you better and more economical results. Write for latest illustrated bulletin giving all the facts about Cortland performance.

21

CORTLAND GRINDING WHEELS CORP.

Diagonal Shearing with Varying Contact Means Better Surface Grinding



A true segment, the grinding surface has narrow ends that *start* the work with minimum shock and resistance. Straight inner edge of segment passes diagonally across work with a *shearing* action that *cuts* and *removes* the metal. Varying contact area insures longer exposure to coolant—decreases heat—reduces segment wear—con-serves power.

CORTLAND

Chucks and Segments

BELLEVUE

Controlled Atmosphere FURNACES

EVERY Bellevue furnace is designed and built for a specific job. Hundreds of furnaces and repeat orders in scores of plants is evidence enough that you can have complete confidence in Bellevue engineers to solve your heat treating problems. Send for complete details.

BELLEVUE INDUSTRIAL FURNACE CO.
2974 BELLEVUE AVENUE DETROIT, MICH.

C-F POSITIONERS



In Any Welding Operation It's "Position" That Counts

Production welding usually means working on top, bottom and on all sides of the weldment. It means a "quick change" of position should be possible for greater time saving, more efficiency, lower costs and greater safety to men and materials. With C-F Positioners a welder can quickly position even the most cumbersome weldments at the press of a button, without crane help or handling crews. With just one set-up of the weldment, he can position it easily, speedily and safely, all alone. He can rotate it a full 360° at variable speeds from 0 R.P.M. up, tilt it to 135° beyond horizontal, and can weld, downhand, all sides, surfaces and angles in the one set-up with larger rods and fewer passes. All C-F Positioners, both stationary and portable, are pedestal mounted to give maximum floor and working clearance and all are adjustable for height.

Write for Bulletin WP-22

CULLEN-FRIESTEDT CO.
1314 S. KILBOURN AVE. CHICAGO 23, ILL.

PRICES

WELDED PIPE AND TUBING

Base Discounts, f.o.b. Pittsburgh District and Lorain, Ohio, Mills
(F.o.b. Pittsburgh only on wrought pipe)
Base Price—\$200.00 per Net Ton

Steel (Butt Weld)

	Black	Galv.
1/2 in.	62 1/2	51
3/4 in.	66 1/2	56
1 to 3 in.	68 1/2	57 1/2

Wrought Iron (Butt Weld)

1/2 in.	24	3 1/2
3/4 in.	30	10
1 and 1/4 in.	34	16
1 1/2 in.	38	18 1/2
2 in.	37 1/2	18

Steel (Lap Weld)

2 in.	61	49 1/2
2 1/2 in. and 3 in.	64	52 1/2
3 1/2 to 6 in.	66	54 1/2

Wrought Iron (Lap Weld)

2 in.	30 1/2	12
2 1/2 to 3 1/2 in.	31 1/2	14 1/2
4 in.	33 1/2	18
4 1/2 to 8 in.	32 1/2	17

Steel (Butt, extra strong, plain ends)

1/2 in.	61 1/2	50 1/2
3/4 in.	65 1/2	54 1/2
1 to 3 in.	67	57

Wrought Iron (Same as Above)

1/2 in.	25	6
3/4 in.	31	12
1 to 2 in.	38	19 1/2

Steel (Lap, extra strong, plain ends)

2 in.	59	48 1/2
2 1/2 and 3 in.	63	52 1/2
3 1/2 to 6 in.	66 1/2	56

Wrought Iron (Same as Above)

2 in.	33 1/2	15 1/2
2 1/2 to 4 in.	39	22 1/2
4 1/2 to 6 in.	37 1/2	21

On butt weld and lap weld steel pipe jobbers are granted a discount of 5%. On less-than-carload shipments prices are determined by adding 25 and 30% and the carload freight rate to the base card.

F.O.B. Gary prices are two points lower discount or \$4 a ton higher than Pittsburgh or Lorain on lap weld and one point lower discount, or \$2 a ton higher on all butt weld.

CAST IRON WATER PIPE

Per Net Ton
6-in. and larger, del'd Chicago... \$54.80
6-in. and larger, del'd New York... 52.20
6 in. and larger, Birmingham... 46.00
6-in. and larger f.o.b. cars, San Francisco or Los Angeles... 69.40
6-in. and larger f.o.b. cars, Seattle. 71.20

Class "A" and gas pipe, \$3 extra; 4-in. pipe is \$3 a ton above 6-in. Prices shown are for lots of less than 200 tons. For 200 tons or over, 6-in. and larger are \$45 at Birmingham and \$53.80 delivered Chicago, \$59.40 at San Francisco and Los Angeles, and \$70.20 at Seattle. Delivered prices do not reflect new 3% per cent tax on freight rates.

BOILER TUBES

Seamless Steel and Lap Weld Commercial Boiler Tubes and Locomotive Tubes. Minimum Wall. Net base prices per 100 ft. f.o.b. Pittsburgh, in carload lots.

	Seamless Weld.	Cold Hot	Drawn Rolled	Rolled
2 in. o.d. 13 B.W.G. 15.03	13.04	12.38		
2 1/2 in. o.d. 12 B.W.G. 20.21	17.54	16.58		
3 in. o.d. 12 B.W.G. 22.48	19.50	18.35		
3 1/2 in. o.d. 11 B.W.G. 28.37	24.63	23.15		
4 in. o.d. 10 B.W.G. 35.20	30.54	28.66		
(Extras for less carload quantities)				
40,000 lb. or ft. and over				Base
30,000 lb. or ft. to 39,999 lb. or ft.				5%
20,000 lb. or ft. to 29,999 lb. or ft.				10%
10,000 lb. or ft. to 9,999 lb. or ft.				20%
5,000 lb. or ft. to 4,999 lb. or ft.				30%
2,000 lb. or ft. to 4,999 lb. or ft.				45%
Under 2,000 lb. or ft.				65%



PRICES

WIRE PRODUCTS

To the trade, f.o.b. Pittsburgh, Chicago, Cleveland, Birmingham, Duluth

	Base per Keg	Pacific Coast Points	Named Points†
Standard wire nails...	\$2.80	\$2.80	
Coated nails	2.80	3.30	
Cut nails, carloads	3.85	...	
Base per 100 lb.			
Annealed fence wire...	\$3.05	\$3.55	
Annealed galv. fence wire	3.40	3.90	
Base Column			
Woven wire fence* ....	.67	.85	
Fence posts, carloads...	.69	.86	
Single loop bale ties...	.59	.84	
Galvanized barbed wire**	.70	.80	
Twisted barbless wire..	.70	...	

*15 1/2 gage and heavier. **On 80-rod coils in carload quantities.

†Prices subject to switching or transportation charges.

BOLTS, NUTS, RIVETS, SET SCREWS

Bolts and Nuts

(f.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Machine and Carriage Bolts:

Base discount less case lots

Per Cent Off List

1/4 in. & smaller x 6 in. & shorter.....	65 1/2
1/8 & 5/16 in. x 6 in. & shorter.....	68 1/2
1/4 to 1 in. x 6 in. shorter.....	61
1/4 in. and larger, all lengths.....	59
All diameters over 6 in. long.....	59
Lag, all sizes	62
Plow bolts	65

Nuts, Cold Punched or Hot Pressed:

(Hexagon or Square)

1/4 in. and smaller	62
5/16 to 1 in. inclusive	59
1/4 to 1 1/4 in. inclusive	57
1 1/4 in. and larger	56

On above bolts and nuts, excepting plow bolts, additional allowance of 10 per cent for full container quantities. There is an additional 5 per cent allowance for carload shipments.

Semi-Fin. Hexagon Nuts U.S.S. S.A.E.

Base discount less keg lots

1/16 in. and smaller.....	64
1/4 in. and smaller	62
1/4 in. through 1 in.	60
5/16 in. through 1 1/4 in.	59
1 1/4 in. and larger	57 58

In full keg lots, 10 per cent additional discount.

Stove Bolts Consumer

Packages, nuts loose

In packages, with nuts attached.....

In bulk

On stove bolts freight allowed up to Mc. per 100 lb. based on Cleveland, Chicago, New York on lots of 200 lb. or over.

Large Rivets (1/2 in. and larger)

Base per 100 Lb.

f.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

\$3.75

Small Rivets (7/16 in. and smaller)

Per Cent Off List

f.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

65 and 5

Cap and Set Screws Consumer

Per Cent Off List

Upset full fin. hexagon head cap screws, coarse or fine thread, up to

and incl. 1 in. x 6 in.

Upset set screws, cup and oval points

Milled studs

Flat head cap screws, listed sizes....

Fillister head cap, listed sizes....

Freight allowed up to 65c. per 100 lb.

based on Cleveland, Chicago or New York on lots of 200 lb. or over.

ROOFING TERNE PLATE

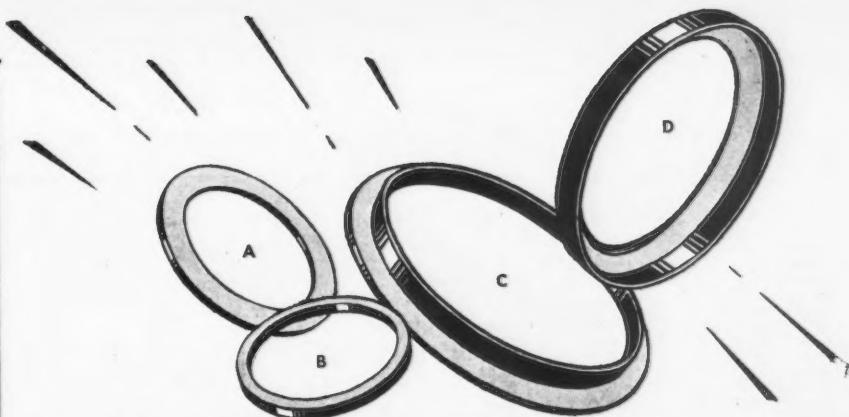
(f.o.b. Pittsburgh, 112 Sheets)

20x14 in. 20x28 in.

1-lb. coating I.C.... \$6.00 \$12.00

2-lb. coating I.C.... 7.00 14.00

3-lb. coating I.C.... 7.50 15.00



For nearly forty years—through peace and war times—King has supplied metal rings and flanges to industry. And throughout that period, the name "King" has been synonymous with highest quality materials, craftsmanship, dependability. Rolled hot or cold from bar stock steel or non-ferrous metals, King Rings and Flanges are true to size, perfectly welded, smooth-finished.

Variety and versatility are seldom found in the equipment of a maker of rings and flanges. But these attributes characterize the King organization. Unusual dimensions, peculiar shapes, the ability to work with company engineers along unprecedented lines—these are qualities you will find at King.

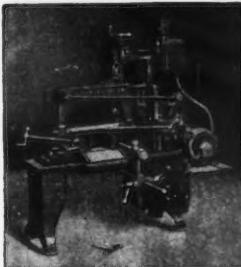
A Flat Flange
B Band Ring

C Leg-out Angle Ring
D Leg-in Angle Ring

KING FIFTH WHEEL COMPANY



2917 N. SECOND STREET, PHILADELPHIA 33, PA.



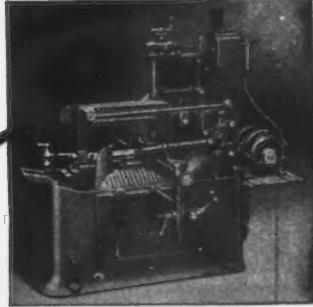
High Speed at Low Cost No. 48

For tool room, stock room, or maintenance shop, this 6' x 6' capacity saw is superior to anything made in its price class. Features similar to MARVEL Heavy Duty Production Planers. Cuts a 2' round pipe in 30 seconds—a 3' round in 3 minutes!

MARVEL SAW'S

2-Speed and 4-Speed

For applications where materials of different hardnesses and alloy characteristics are to be cut, MARVEL 48 is available in 2-Speed and 4-Speed models. Built-in work tracks for holding outer end of bars are also available for all models.



ARMSTRONG-BLUM MFG. CO.

5700 W. Bloomingdale Ave., Chicago 39, Illinois, U.S.A.

PRICES

PIG IRON

All prices set in bold face type are maximum established by OPA as of February 14, 1945. Other domestic prices (in italics) are delivered quotations per gross ton computed on the basis of the official maximum. Delivered price do not reflect 8 per cent tax on freight rate.

	No. 2 Foundry	Basic	Bessemer	Malleable	Low Phosphorus	Charcoal
Boston.....	\$26.50	\$26.00	\$27.50	\$27.00	.....	.....
Brooklyn.....	28.50	28.00	29.00	28.03	.....	.....
Jersey City.....	27.53	27.03	28.53	28.03	.....	.....
Philadelphia.....	26.84	26.34	27.84	27.34	\$31.74	.....
Bethlehem.....	\$26.00	\$25.50	\$27.00	\$26.50	.....	.....
Everett, Mass.....	26.00	25.50	27.00	26.50	.....	.....
Swedenland, Pa.....	26.00	25.50	27.00	26.50	.....	.....
Steelton, Pa.....	25.50	25.50	27.00	26.50	\$30.50	.....
Birdsboro, Pa.....	26.03	25.50	27.00	26.50	30.50	.....
Sparrows Point, Md.....	26.00	25.50	26.00	25.50	.....	.....
Erie, Pa.....	25.00	24.50	26.00	25.50	.....	.....
Neville Island, Pa.....	25.00	24.50	25.50	25.00	.....	.....
Sharpsville, Pa. (1).....	25.00	24.50	25.50	25.00	.....	.....
Buffalo.....	25.00	24.00	26.00	25.50	30.50	.....
Cincinnati, Ohio.....	25.44	25.61	26.11	26.50	.....	.....
Canton, Ohio.....	26.39	25.89	26.89	26.39	33.69	.....
Mansfield, Ohio.....	26.94	26.44	27.44	26.94	33.86	.....
St. Louis.....	25.50	25.00	25.50	25.00	.....	.....
Chicago.....	25.00	24.50	25.50	25.00	36.46	.....
Granite City, Ill.....	25.00	24.50	25.50	25.00	.....	.....
Cleveland.....	25.00	24.50	25.50	25.00	33.42	.....
Hamilton, Ohio.....	25.00	24.50	25.50	25.00	.....	.....
Toledo.....	25.00	24.50	25.50	25.00	.....	.....
Youngstown.....	25.00	24.50	25.50	25.00	33.42	.....
Detroit.....	25.00	24.50	25.50	25.00	.....	.....
Lake Superior, I.C. ....	.....	.....	.....	.....	34.00	.....
Lyles, Tenn., f.o.b. (2).....	.....	.....	.....	.....	33.00	.....
St. Paul.....	27.63	27.13	28.13	27.63	38.69	.....
Duluth.....	25.50	25.00	26.00	25.50	.....	.....
Birmingham.....	21.38	20.00	26.00	.....	.....	.....
Los Angeles.....	27.95	.....	.....	.....	.....	.....
San Francisco.....	27.95	.....	.....	.....	.....	.....
Seattle.....	27.95	.....	.....	.....	.....	.....
Provo, Utah.....	23.00	22.50	.....	.....	.....	.....
Montreal.....	27.50	27.50	.....	28.00	.....	.....
Toronto.....	25.50	25.50	.....	26.00	.....	.....
GRAY FORGE IRON: Valley or Pittsburgh furnace.....	.....	.....	.....	.....	.....	\$24.50

GRAY FORGE IRON: Valley or Pittsburgh furnace..... \$24.50

(1) Struthers Iron & Steel Co., Struthers, Ohio, may charge 50c. a ton in excess of basing point prices for No. 2 foundry, basic, bessemer and malleable.

(2) Price shown is for low-phosphorus iron; high phosphorus sells for \$28.50 at the furnace.

Basing point prices are subject to switching charges; Silicon differentials (not to exceed 50c. a ton for each 0.25 per cent silicon content in excess of base grade which is 1.75 to 2.25 per cent); Phosphorus differentials, a reduction of 38c. per ton for phosphorus content of 0.70 per cent and over; Manganese differentials, a charge not to exceed 50c. per ton for each 0.50 per cent manganese content in excess of 1.00 per cent. Effective March 3, 1943, \$2 per ton extra may be charged for 0.5 to 0.75 per cent nickel content and \$1 per ton extra for each additional 0.25 per cent nickel.

METAL POWDERS

Prices are based on current market prices of ingots plus a fixed figure. F.O.B. shipping point, c. per lb., ton lots.

Copper, electrolytic, 150 and 200 mesh	21 1/2 to 23 1/4c.
Copper, reduced, 150 and 200 mesh	20 1/2 to 25 1/4c.
Iron, commercial, 100 and 200 mesh	12 1/2 to 15c.
Iron, crushed, 200 mesh and finer, 90 + % Fe	4c.
Iron, hydrogen reduced, 300 mesh and finer, 98 1/2 + % Fe, drum lots	63c.
Iron, electrolytic, unannealed, 300 mesh and coarser, 99 + % Fe	30 to 33c.
Iron, electrolytic, annealed minus 100 mesh, 99 + % Fe	42c.
Iron, carbonyl, 300 mesh and finer, 98-99.8 + % Fe	90c.
Aluminum, 100 and 200 mesh	*23 to 27c.
Antimony, 100 mesh	20.6c.
Cadmium, 100 mesh	\$1
Chromium, 150 mesh	\$1.03
Lead, 100, 200 & 300 mesh	11 1/4 to 12 1/4c.
Manganese, 150 mesh	5ic.
Nickel, 150 mesh	51 1/4c.
Solder powder, 100 mesh	8 1/2c. plus metal
Tin, 100 mesh	58 1/2c.
Tungsten metal powder, 99%, any quantity, per lb.	\$2.60
Molybdenum powder, 99%, in 200-lb. kegs, f.o.b. York, Pa., per lb.	\$2.60
Under 100 lb.	\$3.00

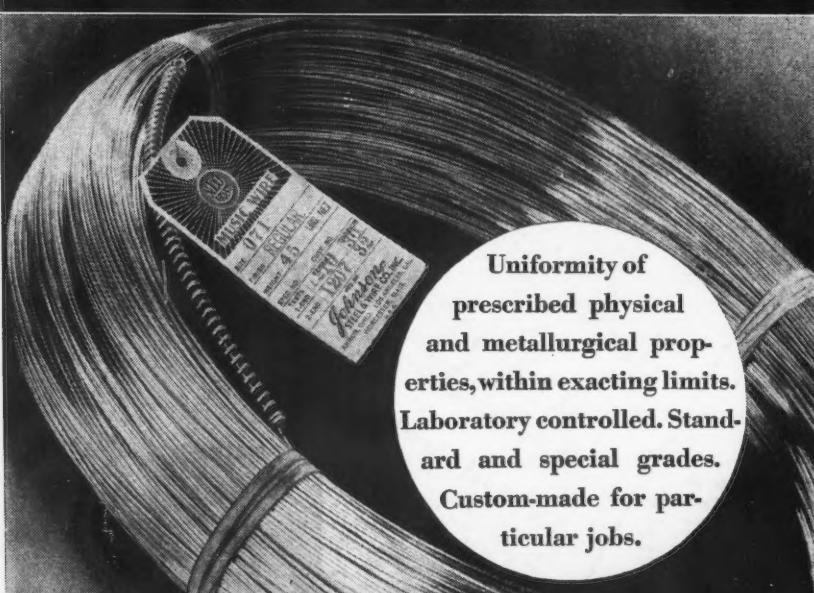
*Freight allowed east of Mississippi.

COKE

Furnace, beehive (f.o.b. oven)	Net Ton \$7.00*
Connellsburg, Pa.	.....
Foundry, beehive (f.o.b. oven)	.....
Fayette Co., W. Va.	8.10
Connellsburg, Pa.	8.25
Foundry, By-Product	.....
Chicago, del'd	13.35
Chicago, f.o.b.	12.60
New England, del'd	14.25
Kearny, N. J., f.o.b.	12.65
Philadelphia, del'd	12.88
Buffalo, del'd	13.00
Portsmouth, Ohio, f.o.b.	11.10
Painesville, Ohio, f.o.b.	11.75
Erie, del'd	12.75
Cleveland, del'd	12.80
Cincinnati, del'd	12.85
St. Louis, del'd	13.85
Birmingham, del'd	10.50

*Hand drawn ovens using trucked coal permitted to charge \$7.75 per ton plus transportation charges.

JOHNSON *wire*



**Uniformity of
prescribed physical
and metallurgical prop-
erties, within exacting limits.
Laboratory controlled. Standard
and special grades.
Custom-made for par-
ticular jobs.**

JOHNSON STEEL & WIRE CO., INC.
WORCESTER 1, MASSACHUSETTS

NEW YORK

AKRON

CHICAGO

LOS ANGELES

PRICES

REFRACTORIES (F.o.b. Works)

Fire Clay Brick

	Per 1000
Super-duty brick, St. Louis	\$62.55
First quality, Pa., Md., Ky., Mo., Ill.	52.85
First quality, New Jersey	57.70
Sec. quality, Pa., Md., Ky., Mo., Ill.	47.95
Sec. quality, New Jersey	52.55
No. 1 Ohio	44.30
Ground fire clay, net ton	7.80

Silica Brick

	Per Net Ton
Standard chemically bonded, Balt., Plymouth Meeting, Chester	\$54.00
Chemically bonded, Baltimore	65.00

Magnesite Brick

	Per Gross Ton
Standard, Balt. and Chester	\$76.00
Chemically bonded, Baltimore	65.00

Grain Magnesite

	Per Net Ton
Domestic, f.o.b. Balt. and Chester	\$43.48
Domestic, f.o.b. Chewelah, Wash. (in bulk)	22.00

RAILS, TRACK SUPPLIES

(F.o.b. Mill)

	Standard rails, heavier than 60 lb., No. 1 O.H., gross ton	\$43.00
Angle splice bars, 100 lb.	2.70	
(F.o.b. Basing Points)	Per Gross Ton	
Light rails (from billets)	\$43.00	
Light rails (from rail steel)	39.00	
Cut spikes	3.00c.	
Screw spikes	5.15c.	
Tie plate, steel	2.15c.	
Tie plates, Pacific Coast	2.30c.	
Track bolts	4.75c.	
Track bolts, heat treated, to railroads	5.00c.	
Track bolts, jobbers discount	63.5	
Basing points, light rails, Pittsburgh, Chicago, Birmingham; cut spikes and tie plates—Pittsburgh, Chicago, Portsmouth, Ohio, Weirton, W. Va., St. Louis, Kansas City, Minnequa, Colo., Birmingham and Pacific Coast ports; tie plates alone—Steelton, Pa., Buffalo. Cut spikes alone—Youngstown, Lebanon, Pa., Richmond, Oregon and Washington ports, add 25c.		

CORROSION AND HEAT-RESISTING STEEL

(Per lb. base price, f.o.b. Pittsburgh)

Chromium-Nickel Alloys

No. 304	No. 302
Forging billets	21.25c.
Bars	25.00c.
Plates	29.00c.
Structural shapes	25.00c.
Sheets	36.00c.
Hot rolled strip	23.50c.
Cold rolled strip	30.00c.
Drawn wire	25.00c.
	24.00c.

Straight-Chromium Alloys

No. 410	No. 430	No. 442	No. 446
F.Billets	15.725c.	16.15c.	19.125c.
Bars	18.50c.	19.00c.	22.50c.
Plates	21.50c.	22.00c.	25.50c.
Sheets	26.50c.	29.00c.	32.50c.
Hot strip	17.00c.	17.50c.	24.00c.
Cold strip	22.90c.	22.50c.	32.00c.
			52.00c.

Chromium-Nickel Clad Steel (20%)

No. 304
Plates
Sheets

*Includes annealing and pickling.

ELECTRICAL SHEETS (Base, f.o.b. Pittsburgh)

Per Lb.

Field grade	3.20c.
Armature	3.55c.
Electrical	4.05c.
Motor	4.95c.
Dynamo	5.65c.
Transformer 72	6.15c.
Transformer 65	7.15c.
Transformer 58	7.65c.
Transformer 52	8.45c.
F.o.b. Granite City, add 10c. per 100 lb. on field grade to and including dynamo. Pacific ports add 75c. per 100 lb. on all grades.	

OHIO SHEARS

SOLID STEEL—all grades

LAID STEEL—hi-speed and carbon

ROTARY SHEARS and SLITTERS

The OHIO KNIFE Co.

CINCINNATI 23,
OHIO



HOW TO LOAD & UNLOAD FREIGHT CARS



KRANE KAR — Swing Boom Mobile Crane

KRANE KAR transports the loads to and from the cars. You don't waste time maneuvering the vehicle . . . just operate the live boom from side to side with load on the hook. KRANE KAR reaches into the farthest recesses of the car to position or remove loads. For box, flat, or gondola cars.

USERS: Bethlehem Steel; Consolidated Steel; Columbia Steel; Pullman Standard Car Mfg. Co.; Ajax Steel & Forge; Boeing Airplane Co., etc.

THE ORIGINAL SWING BOOM MOBILE CRANE
WITH FRONT-WHEEL DRIVE AND REAR-WHEEL STEER

2½, 5, AND 10 TON CAPACITIES

KRANE KAR

SILENT HOIST & CRANE CO., 851 63RD ST., BROOKLYN 20, N.Y.



PRICES

Ferromanganese

78-82% Mn, maximum contract base price per gross ton, lump size, f.o.b. car at Baltimore, Bethlehem, Philadelphia, New York, Birmingham, Rockdale Rockwood, Tenn. Carload lots (bulk) \$135.00 Carload lots (packed) 141.00 Less ton lots (packed) 142.50 \$1.70 for each 1% above 82% Mn; penalty, \$1.70 for each 1% below 78%.

Manganese Metal

Contract basis, lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Spot sales add 2c. per lb.

96-98% Mn, 2% max. C, 1% max. Si	2% max. Fe.	Carload, bulk	38c
95-97% Mn, 2% max. C, 1.5% max. Si	2.5% max. Fe.	L.C.L. lots	38c
90-95% Mn, 11.05c.	11.20c.	Carload, bulk	34c
90-95% Mn, 11.05c.	11.20c.	L.C.L. lots	38c

Spiegelalisen

Maximum base, contract prices, per gross ton, lump, f.o.b. Palmerston, Pa.

16-19% Mn	19-21% Mn
3% max. Si	3% max. Si
Carloads	\$35.00
Less ton	47.50

Electric Ferrosilicon

OPA maximum base price cents per lb. contained Si, lump size in carloads, f.o.b. shipping point with freight allowed.

Eastern	Central	Western
Zone	Zone	Zone
50% Si	6.65c.	7.10c.
75% Si	8.05c.	8.20c.
80-90% Si	8.90c.	9.08c.
90-95% Si	11.05c.	11.20c.
Spot sales add: 45c. per lb. for 50% Si, .3c. per lb. for 75% Si, .25c. per lb. for 80-90% and 90-95% Si.		

Silver Iron

(C/L, Per Gross Ton, base 6.00 to 6.50 \$1) F.o.b. Jackson, Ohio \$30.50 Buffalo 31.75

For each additional 0.50% silicon add \$1 a ton. For each 0.50% manganese over 1% add 50c. a ton. Add \$1 a ton for 0.75% phosphorus or over.

Bessemer Ferrosilicon

Prices are \$1 a ton above silvery iron quotations of comparable analysis.

Silicon Metal

OPA maximum base price per lb. of contained Si, lump size, f.o.b. shipping point with freight allowed to destination, for l.c.l. above 2000 lb., packed. Add .25c. for spot sales.

Eastern	Central	Western
Zone	Zone	Zone
96% Si, 2% Fe.	13.10c.	13.55c.
97% Si, 1% Fe.	13.45c.	13.90c.
		16.80c.

Ferrosilicon Briquets

OPA maximum base price per lb. of briquet, bulk, f.o.b. shipping point with freight allowed to destination. Approximately 40% Si. Add .25c. for spot sales.

Eastern	Central	Western
Zone	Zone	Zone
2.95c.	3.35c.	3.50c.
Carload, bulk	4.50c.	4.25c.
2000 lb.-carload	4.8c.	4.25c.

Silicomanganese

Contract basis lump size, per lb. of metal, f.o.b. shipping point with freight allowed. Add .25c. for spot sales. 65-70% Mn, 17-20% Si, 1.5% max. C.

Carload, bulk	6.05c.
2000 lb. to carload	6.70c.
Under 2000 lb.	6.90c.
Briquets, contract, basis carlots, bulk freight allowed, per lb.	5.20c.
2000 lb. to carload	6.20c.
Less ton lots	6.55c.

Ferrochrome

(65-72% Cr, 2% max. Si) OPA maximum base contract prices per lb. of contained Cr, lump size in carload lots, f.o.b. shipping point, freight allowed to destination. Add .25c. per lb. contained Cr for spot sales.

Eastern	Central	Western
Zone	Zone	Zone
0.06% C	23.00c.	23.40c.
0.10% C	22.50c.	22.90c.
0.15% C	22.00c.	22.40c.
0.20% C	21.50c.	21.90c.
0.50% C	21.00c.	21.40c.
1.00% C	20.50c.	20.90c.
2.00% C	19.50c.	19.90c.
66-71% Cr, 4-10%	13.00c.	13.40c.
62.66% Cr, 5-7% C	13.50c.	13.90c.
		14.50c.



ANY METAL • ANY PERFORATION

The
Harrington & King
PERFORATING CO.

5657 FILLMORE STREET—CHICAGO 44, ILL.
Eastern Office, 114 Liberty Street, New York 6, N. Y.



You Can Depend On
"Hercules" (Red Strand) Wire Rope

Highlights of Quality

1. Acid Open-Hearth Steel Wire
2. Rigid Tests and Inspections
3. Correct Manufacturing Methods
4. Furnished in both the Round and Flattened Strand constructions, in either Standard or Preformed Type.

• Results are what count, and the performance record of this wire rope continues to make and hold friends.

There is no guess work when you use "HERCULES" (Red Strand) Wire Rope. It is designed and built to do specific jobs better... safer... more economically. If you will tell us how you use wire rope, we shall be glad to suggest the construction and type most suitable for your conditions.



FERROALLOY PRICES

High-Nitrogen Ferrochrome

Low-carbon type: 67-72% Cr, 0.75% N. Add 2c. per lb. to regular low-carbon ferrochrome price schedule. Add 2c. for each additional 0.25% N. High-carbon type: 66-71% Cr, 4-5% C, 0.75% N. Add 5c. per lb. to regular high-carbon ferrochrome price schedule.

Low-Carbon Ferromanganese

Contract prices per lb. of manganese contained, lump size, f.o.b. shipping point, freight allowed to destination, Eastern Zone. Add 0.25c. for spot sales.

Carloads, Ton Bulk Lots Less

	Bulk	Lots	Ton
0.10% max. C, 1 or 2% max. Si	23.00c.	23.40c.	23.65c.
0.15% max. C, 1 or 2% max. Si	22.00c.	22.40c.	22.65c.
0.30% max. C, 1 or 2% max. Si	21.00c.	21.40c.	21.65c.
0.50% max. C, 1 or 2% max. Si	20.00c.	20.40c.	20.65c.
0.75% max. C, 7.00% max. Si	16.00c.	16.40c.	16.65c.

Ferrochrome Briquets

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 60 per cent contained chromium. Add 0.25c. for spot sales.

Eastern Central Western

	Zone	Zone	Zone
Carload, bulk..	\$1.25c.	8.55c.	8.95c.
Ton lots ..	8.75c.	9.25c.	10.75c.
Less ton lots ..	9.00c.	9.50c.	11.00c.

Ferromanganese Briquets

Contract prices per lb. of briquet, f.o.b. shipping point, freight allowed to destination. Approx. 66 per cent contained manganese. Add 0.25c. for spot sales.

Eastern Central Western

	Zone	Zone	Zone
Carload, bulk..	6.05c.	6.30c.	6.60c.
Ton lots ..	6.65c.	7.55c.	8.55c.
Less ton lots ..	6.80c.	7.80c.	8.80c.

Calcium—Manganese—Silicon

Contract prices per lb. of alloy, lump size, f.o.b. shipping point, freight allowed to destination.

16-20% Ca, 14-18% Mn, 53-59% Si. Add 0.25c. for spot sales.

Eastern Central Western

	Zone	Zone	Zone
Carloads ..	15.50c.	16.00c.	18.05c.
Ton lots ..	16.50c.	17.35c.	19.10c.
Less ton lots ..	17.00c.	17.85c.	19.60c.

Calcium Metal

Eastern zone contract prices per lb. of metal, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. Add 0.9c. for Central Zone; 0.49c. for Western Zone.

Cast Turnings Distilled

	Ten lots ..	\$1.80	\$2.30	\$5.00
Less ton lots ..	1.30	2.80	5.75	

Chromium—Copper

Contract price per lb. of alloy, f.o.b. Niagara Falls, freight allowed east of the Mississippi River. 8-11% Cr, 88-90% Cu, 1.00% max. Fe, 0.50% max. Si. Add 5c. for spot sales. Shot or ingot

45c.

Ferroboron

Contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination. Add 5c. for spot sales. 17.50% min. B, 1.50% max. Si, 0.50% max. Al, 0.50% max. C.

Eastern Central Western

	Zone	Zone	Zone
Ton lots ..	\$1.20	\$1.2075	\$1.229
Less ton lots ..	1.30	1.3075	1.329

Manganese—Boron

Contract prices per lb. of alloy, f.o.b. shipping point, freight charges allowed. Add 5c. for spot sales. 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C.

Eastern Central Western

	Zone	Zone	Zone
Ton lots ..	\$1.89	\$1.903	\$1.935
Less ton lots ..	2.01	2.023	2.055

Nickel—Boron

Spot and contract prices per lb. of alloy, f.o.b. shipping point, freight allowed to destination. 15-18% B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni.

Eastern Central Western

	Zone	Zone	Zone
11.200 lb.			
or more ..	\$1.90	\$1.9125	\$1.9445
Ton lots ..	2.00	2.09125	2.0445
Less ton lots ..	2.10	2.1125	2.1445

Other Ferroalloys

Ferrotungsten, Standard grade, lump or $\frac{1}{4}$ X down, packed, f.o.b. plant at Niagara Falls, New York, Washington, Pa., York, Pa., per lb. contained tungsten, 10,000 lb. or more... \$1.90

Ferrovanadium, 35-55%, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. contained Va.

Open hearth

Crucible

Primos

Cobalt, 97% min., keg packed, contract basis, f.o.b. producer's plant, usual freight allowances, per lb. of cobalt metal

\$1.50

Vanadium pentoxide, 88-92% V_2O_5 , technical grade, contract basis, any quantity, per lb. contained V_2O_5 . Spot sales add 5c. per lb. contained V_2O_5

\$1.10

Silcaz No. 3, contract basis, f.o.b. producer's plant with usual freight allowances, per lb. of alloy. (Pending OPA approval) Carload lots

25c.

2000 lb. to carload

26c.

Silvax No. 3, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy (Pending OPA approval) Carload lots

58c.

2000 lb. to carload

59c.

Grainal, f.o.b. Bridgeville, Pa., freight allowed 50 lb. and over, max. based on rate to St. Louis No. 1

87.5c.

No. 6

60c.

No. 79

45c.

Bortram, f.o.b. Niagara Falls, Ton lots, per lb.

45c.

Less ton lots, per lb.

50c.

Ferrocolumbium, 50-60%, contract basis, f.o.b. plant with freight allowances, per lb. contained Cb. 2000 lb. lots

\$2.25

Under 2000 lb. lots

\$2.30

Ferrotitanium, 40-45%, 0.10% C, max. f.o.b. Niagara Falls, N. Y., freight allowed East of Mississippi River, North of Baltimore and St. Louis, per carload

\$142.50

Ferrophosphorus, 18% electric or blast furnaces, f.o.b. Anniston, Ala., carlots, with \$3 unitage freight equalled with Rockdale, Tenn., per gross ton

\$58.50

Ferrophosphorus, electrolytic 23-26%, carlots, f.o.b. Monsanto (Sigo), Tenn., \$3 unitage freight equalled with Nashville, per gross ton

\$75.00

Ferromolybdenum, 55-75%, f.o.b. Langloch, Washington, Pa., any quantity, per lb. contained Mo.

95c.

Calcium molybdate, 40-45%, f.o.b. Langloch and Washington, Pa., any quantity, per lb. contained Mo.

80c.

Molybdenum oxide briquets, 48-52% Mo, f.o.b. Langloch, Pa., per lb. contained Mo.

80c.

Molybdenum oxide, in cans, f.o.b. Langloch and Washington, Pa., per lb. contained Mo.

80c.

Zirconium, 35-40%, contract basis, f.o.b. producer's plant with freight allowances, per lb. of alloy. Add $\frac{1}{4}$ c. for spot sales

14c.

Carload lots

4.6c.

Zirconium, 12-15%, contract basis, lump f.o.b. plant usual freight allowances, per lb. of alloy

7.25c.

Carload, bulk

5.75c.

Alsifer (approx. 20% Al, 40% Si and 40% Fe), contract basis, f.o.b. Niagara Falls, carload, bulk

7.25c.

Ton lots

8.00c.

Ton lots

8.75c.

Less ton lots

9.25c.

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